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PART 70 SIGNIFICANT SOURCE MODIFICATION AND MAJOR MODIFICATION UNDER PREVENTION OF SIGNIFICANT DETERIORATION

OFFICE OF AIR QUALITY

**Nucor Steel
RR 2, Box 311, County Road 400 East
Crawfordsville, Indiana 47933**

(herein known as the Permittee) is hereby authorized to construct and operate subject to the conditions contained herein, the emission units described in Section A (Source Summary) of this approval.

This permit is issued under the provisions of 326 IAC 2 and 40 CFR Part 52.21 (Prevention of Significant Deterioration) and 40 CFR 124 (Procedure for Decision Making), with conditions listed on the attached pages.

This approval is also issued in accordance with 40 CFR 70 Appendix A and Contains the conditions and provisions specified in 326 IAC 2-7 as required by 42 U.S.C. 7401, et.seq. (Clean Air Act as amended by the 1990 Clean Air Act amendments), 40 CFR Part 70.6, IC 13-15 and IC 13-17.

Significant Source Modification No.: 107-14297-00038	
Issued by: Original Signed by Paul Dubenetzky Paul Dubenetzky, Branch Chief Office of Air Quality	Issuance Date: June 6, 2002

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SECTION A

SOURCE SUMMARY

This approval is based on information requested by the Indiana Department of Environmental Management (IDEM), Office of Air Quality (OAQ). The information describing the emission units contained in conditions A.1 through A.2 is descriptive information and does not constitute enforceable conditions. However, the Permittee should be aware that a physical change or a change in the method of operation that may render this descriptive information obsolete or inaccurate may trigger requirements for the Permittee to obtain additional permits or seek modification of this approval pursuant to 326 IAC 2, or change other applicable requirements presented in the permit application.

A.1 General Information [326 IAC 2-7-4(c)] [326 IAC 2-7-5(15)]

The Permittee owns and operates a stationary steel manufacturing plant.

Responsible Official: John J. Ferriola
Source Address: RR 2, Box 311, County Road 400 East, Crawfordsville, IN 47933
Mailing Address: RR 2, Box 311, County Road 400 East, Crawfordsville, IN 47933
Phone Number: 765-364-1323
SIC Code: 3312
County Location: Montgomery
County Status: Attainment for all criteria pollutants
Source Status: Part 70 Permit Program
Major Source under PSD
Major Source pursuant to Section 112 of the Clean Air Act
One of 28 Listed Categories

A.2 Emission Units and Pollution Control Equipment Summary [326 IAC 2-7-4(c)(3)] [326 IAC 2-7-5(15)]

This modification to a stationary source is approved to construct and operate the following emission units and pollution control devices:

1. Thirty six (36) Main Burners, each at 1.622 MMBtu/hour and three (3) Auxiliary Burners, each at 0.1 MMBtu/hour in the preheat furnace section of the galvanizing line using natural gas rated at maximum total capacity of 58.7 MMBtu per hour. The NO_x emissions are controlled by a Selective Catalytic Reduction / Selective Non-Catalytic Reduction (SCR/SNCR) Systems.
2. Forty four (44) Burners, each at 0.323 MMBtu/hour in radiant tube section with a maximum total capacity of 14.2 MMBtu per hour and option to replace non-conforming burners. The NO_x emissions are controlled by SCR System.

The SCR/SNCR and SCR systems shall be referred to collectively as the SCR/SNCR system.

3. Add a new galvalum tank to the galvanizing line.
4. Modify galvanizing line to bypass zinc pot to produce annealed steel, phosphate or chromate application in addition to producing galvanized steel.
5. Further Nucor has provided details of small emission units at galvanizing line as follows:
 - (a) One (1) auxiliary burner with maximum heat input rate of 3.2 MMBtu per hour in the Alkaline Cleaning Section.
 - (b) Two (2) auxiliary burners with maximum heat input rate of 1.5 MMBtu per hour each in the Strip Dryer Section.
 - (c) Four (4) auxiliary burners with maximum heat input rate of 0.052 MMBtu per hour each in the Pot Roll Heater.
 - (d) Two (2) emergency burners with maximum heat input rate of 0.58 MMBtu per hour each in the Zinc Pot Section.

- (e) Two (2) auxiliary burners with maximum heat input rate of 0.013 MMBtu per hour each in the Preheat open end burners section.
- (f) One (1) Mist Eliminator with maximum capacity of 5000 acfm in the Alkaline Cleaning Section.

6. The burners specified above use natural gas as primary fuel and propane as backup fuel.

A.3 Specifically Regulated Insignificant Activities [326 IAC 2-7-1(21)] [326 IAC 2-7-4(c)] [326 IAC 2-7-5(15)]

This modification to a stationary source also includes the following insignificant activities, which are specifically regulated, as defined in 326 IAC 2-7-1(21):

- (a) Continuous welding station and chromate application.

A.4 Part 70 Permit Applicability [326 IAC 2-7-2]

This stationary source is required to have a Part 70 permit by 326 IAC 2-7-2 (Applicability) because:

- (a) It is a major source, as defined in 326 IAC 2-7-1(22);
- (b) It is a source in a source category designated by the United States Environmental Protection Agency (U.S. EPA) under 40 CFR 70.3 (Part 70 - Applicability).

SECTION B GENERAL CONSTRUCTION CONDITIONS

B.1 Definitions [326 IAC 2-7-1]

Terms in this permit shall have the definition assigned to such terms in the referenced regulation. In the absence of definitions in the referenced regulation, the applicable definitions found in the statutes or regulations (IC 13-11, 326 IAC 1-2 and 326 IAC 2-7) shall prevail.

B.2 Effective Date of the Permit [IC13-15-5-3]

Pursuant to 40 CFR 124.15, 40 CFR 124.19, and 40 CFR 124.20, the effective date of this permit will be thirty (30) days after the service of notice of the decision, except as provided in 40 CFR 124. Three (3) days shall be added to the thirty (30) day period if service of notice is by mail.

B.3 Permit Expiration Date [326 IAC 2-2-8(a)(1)] [40 CFR 52.21(r)(2)]

Pursuant to 40 CFR 52.21(r)(2) and 326 IAC 2-2-8(a)(1) (PSD Requirements: Source Obligation) this permit to construct shall expire if construction is not commenced within eighteen (18) months after receipt of this approval or if construction is discontinued for a continuous period of eighteen (18) months or more, or if construction is not completed within reasonable time. IDEM may extend the eighteen (18) month period upon satisfactory showing that an extension is justified.

B.4 Significant Source Modification [326 IAC 2-7-10.5(h)]

This document shall also become the approval to operate pursuant to 326 IAC 2-7-10.5(h) when, prior to start of operation, the following requirements are met:

- (a) The attached affidavit of construction shall be submitted to the Office of Air Quality (OAQ), Permit Administration & Development Section, verifying that the emission units were constructed as proposed in the application or the permit. The emissions units covered in the Significant Source Modification approval may begin operating on the date the affidavit of construction is postmarked or hand delivered to IDEM if constructed as proposed.
- (b) If actual construction of the emissions units differs from the construction proposed in the application or the permit in a manner that is regulated under the provisions of 326 IAC 2-2, the source may not begin operation until the source modification has been revised pursuant to the provisions of that rule and the provisions of 326 IAC 2-1.1-6 and an Operation Permit Validation Letter is issued.
- (c) If actual construction of the emissions units differs from the construction proposed in the application or the permit in a manner that is not regulated under the provisions of 326 IAC 2-2, the source may not begin operation until the source modification has been revised pursuant to the provisions of that rule and the provisions of 326 IAC 2-7-11 or 326 IAC 2-7-12 and an Operation Permit Validation Letter is issued.
- (d) The Permittee shall receive an Operation Permit Validation Letter from the Chief of the Permit Administration & Development Section and attach it to this document.
- (e) The changes covered by the Significant Source Modification will be included in the Title V draft.

C.1 Certification [326 IAC 2-7-4(f)][326 IAC 2-7-6(1)][326 IAC 2-7-5(3)(C)]

- C.2 Preventive Maintenance Plan [326 IAC 2-7-5(1),(3) and (13)] [326 IAC 2-7-6(1) and (6)]
[326 IAC 1-6-3]

- The PMP does not require the certification by the “responsible official” as defined by 326 IAC 2-7-1(34).

- ### C.3 Permit Amendment or Modification [326 IAC 2-7-11] [326 IAC 2-7-12]

- (a) Permit amendments and modifications are governed by the requirements of 326 IAC 2-7-11 or 326 IAC 2-7-12 whenever the Permittee seeks to amend or modify this permit.

- (b) Any application requesting an amendment or modification of this permit shall be submitted to:

Indiana Department of Environmental Management
Permits Branch, Office of Air Quality
100 North Senate Avenue, P.O. Box 6015
Indianapolis, Indiana 46206-6015

Any such application shall be certified by the Aresponsible official@ as defined by 326 IAC 2-7-1(34).

- (c) The Permittee may implement administrative amendment changes addressed in the request for an administrative amendment immediately upon submittal of the request. [326 IAC 2-7-11(c)(3)]

C.4 Inspection and Entry [326 IAC 2-7-6]

Upon presentation of proper identification cards, credentials, and other documents as may be required by law, and subject to the Permittee-s right under all applicable laws and regulations to assert that the information collected by the agency is confidential and entitled to be treated as such, the Permittee shall allow IDEM, OAQ, U.S. EPA, or an authorized representative to perform the following:

- (a) Enter upon the Permittee's premises where a Part 70 source is located, or emissions related activity is conducted, or where records must be kept under the conditions of this approval;
- (b) Have access to and copy, at reasonable times, any records that must be kept under this title or the conditions of this approval or any operating permit revisions;
- (c) Inspect, at reasonable times, any processes, emissions units (including monitoring and air pollution control equipment), practices, or operations regulated or required under this approval or any operating permit revisions;
- (d) Sample or monitor, at reasonable times, substances or parameters for the purpose of assuring compliance with this approval or applicable requirements; and
- (e) Utilize any photographic, recording, testing, monitoring, or other equipment for the purpose of assuring compliance with this approval or applicable requirements.

C.5 Opacity [326 IAC 5-1]

Pursuant to 326 IAC 5-1-2 (Opacity Limitations), except as provided in 326 IAC 5-1-3 (Temporary Alternative Opacity Limitations), opacity shall meet the following, unless otherwise stated in this permit:

- (a) Opacity shall not exceed an average of forty percent (40%) in any one (1) six (6) minute averaging period as determined in 326 IAC 5-1-4.
- (b) Opacity shall not exceed sixty percent (60%) for more than a cumulative total of fifteen (15) minutes (sixty (60) readings as measured according to 40 CFR 60, Appendix A, Method 9 or fifteen (15) one (1) minute nonoverlapping integrated averages for a continuous opacity monitor) in a six (6) hour period.

C.6 Fugitive Dust Emissions [326 IAC 6-4]

The Permittee shall not allow fugitive dust to escape beyond the property line or boundaries of the property, right-of-way, or easement on which the source is located, in a manner that would violate 326 IAC 6-4 (Fugitive Dust Emissions). 326 IAC 6-4-2(4) is not federally enforceable.

Testing Requirements [326 IAC 2-7-6(1)]

C.7 Performance Testing [326 IAC 3-6][326 IAC 2-1.1-11]

- (a) Compliance testing on new emission units shall be conducted within 60 days after achieving maximum production rate, but no later than 180 days after initial start-up, if specified in Section D of this approval. All testing shall be performed according to the provisions of 326 IAC 3-6 (Source Sampling Procedures), except as provided elsewhere in this approval, utilizing any applicable procedures and analysis methods specified in 40 CFR 51, 40 CFR 60, 40 CFR 61, 40 CFR 63, 40 CFR 75, or other procedures approved by IDEM, OAQ.

A test protocol, except as provided elsewhere in this approval, shall be submitted to:

Indiana Department of Environmental Management
Compliance Data Section, Office of Air Quality
100 North Senate Avenue, P. O. Box 6015
Indianapolis, Indiana 46206-6015

no later than thirty-five (35) days prior to the intended test date. The protocol submitted by the Permittee does not require certification by the "responsible official" as defined by 326 IAC 2-7-1(34).

- (b) The Permittee shall notify IDEM, OAM of the actual test date at least fourteen (14) days prior to the actual test date. The notification submitted by the Permittee does not require certification by the "responsible official" as defined by 326 IAC 2-7-1(34).
- (c) Pursuant to 326 IAC 3-6-4(b), all test reports must be received by IDEM, OAQ within forty-five (45) days after the completion of the testing. An extension may be granted by IDEM, OAM, if the source submits to IDEM, OAM, a reasonable written explanation within five (5) days prior to the end of the initial forty-five (45) day period.

Compliance Requirements [326 IAC 2-1.1-11]

C.8 Compliance Requirements [326 IAC 2-1.1-11]

The commissioner may require stack testing, monitoring, or reporting at any time to assure compliance with all applicable requirements. Any monitoring or testing shall be performed in accordance with 326 IAC 3 or other methods approved by the commissioner or the U. S. EPA.

Compliance Monitoring Requirements [326 IAC 2-7-5(1)] [326 IAC 2-7-6(1)]

C.9 Compliance Monitoring [326 IAC 2-7-5(3)] [326 IAC 2-7-6(1)]

If required by Section D, all monitoring and record keeping requirements shall be implemented within 120 days of permit issuance. The Permittee shall be responsible for installing any necessary equipment and initiating any required monitoring related to that equipment.

C.10 Maintenance of Emission Monitoring Equipment [326 IAC 2-7-5(3)(A)(iii)]

- (a) In the event that a breakdown of the emission monitoring equipment occurs, a record shall be made of the times and reasons of the breakdown and efforts made to correct the problem. To the extent practicable, supplemental or intermittent monitoring of the

parameter should be implemented at intervals no less frequent than required in Section D of this permit until such time as the monitoring equipment is back in operation. In the case of continuous monitoring, supplemental or intermittent monitoring of the parameter should be implemented at intervals no less often than once an hour until such time as the continuous monitor is back in operation.

- (b) The Permittee shall install, calibrate, quality assure, maintain, and operate all necessary monitors and related equipment. In addition, prompt corrective action shall be initiated whenever indicated.

C.11 Pressure Gauge Specifications

Whenever a condition in this permit requires the measurement of pressure drop across any part of the unit or its control device, the gauge employed shall have a scale such that the expected normal reading shall be no less than twenty percent (20%) of full scale and be accurate within plus or minus two percent ($\pm 2\%$) of full scale reading.

Corrective Actions and Response Steps [326 IAC 2-7-5] [326 IAC 2-7-6]

C.12 Emergency Provisions [326 IAC 2-7-16]

- (a) An emergency, as defined in 326 IAC 2-7-1(12), is not an affirmative defense for an action brought for noncompliance with a federal or state health-based emission limitation.
- (b) An emergency, as defined in 326 IAC 2-7-1(12), constitutes an affirmative defense to an action brought for noncompliance with a technology-based emission limitation if the affirmative defense of an emergency is demonstrated through properly signed, contemporaneous operating logs or other relevant evidence that describe the following:
 - (1) An emergency occurred and the Permittee can, to the extent possible, identify the causes of the emergency;
 - (2) The permitted facility was at the time being properly operated;
 - (3) During the period of an emergency, the Permittee took all reasonable steps to minimize levels of emissions that exceeded the emission standards or other requirements in this permit;
 - (4) For each emergency lasting one (1) hour or more, the Permittee notified IDEM, OAQ within four (4) daytime business hours after the beginning of the emergency, or after the emergency was discovered or reasonably should have been discovered;

Telephone Number: 1-800-451-6027 (ask for Office of Air Quality, Compliance Section), or
Telephone Number: 317-233-5674 (ask for Compliance Section)
Facsimile Number: 317-233-5967

- (5) For each emergency lasting one (1) hour or more, the Permittee submitted the attached Emergency Occurrence Report Form or its equivalent, either by mail or facsimile to:

Indiana Department of Environmental Management
Compliance Branch, Office of Air Quality
100 North Senate Avenue, P. O. Box 6015
Indianapolis, Indiana 46206-6015

within two (2) working days of the time when emission limitations were exceeded

due to the emergency.

The notice fulfills the requirement of 326 IAC 2-7-5(3)(C)(ii) and must contain the following:

- (A) A description of the emergency;
- (B) Any steps taken to mitigate the emissions; and
- (C) Corrective actions taken.

The notification which shall be submitted by the Permittee does not require the certification by the "responsible official" as defined by 326 IAC 2-7-1(34).

- (6) The Permittee immediately took all reasonable steps to correct the emergency.
- (c) In any enforcement proceeding, the Permittee seeking to establish the occurrence of an emergency has the burden of proof.
- (d) This emergency provision supersedes 326 IAC 1-6 (Malfunctions). This permit condition is in addition to any emergency or upset provision contained in any applicable requirement.
- (e) IDEM, OAQ may require that the Preventive Maintenance Plans required under 326 IAC 2-7-4-(c)(10) be revised in response to an emergency.
- (f) Failure to notify IDEM, OAQ by telephone or facsimile of an emergency lasting more than one (1) hour in accordance with (b)(4) and (5) of this condition shall constitute a violation of 326 IAC 2-7 and any other applicable rules.
- (g) If the emergency situation causes a deviation from a technology-based limit, the Permittee may continue to operate the affected emitting facilities during the emergency provided the Permittee immediately takes all reasonable steps to correct the emergency and minimize emissions.

C.13 Actions Related to Noncompliance Demonstrated by a Stack Test [326 IAC 2-7-5] [326 IAC 2-7-6]

- (a) When the results of a stack test performed in conformance with Section C - Performance Testing, of this permit exceed the level specified in any condition of this permit, the Permittee shall take appropriate response actions. The Permittee shall submit a description of these response actions to IDEM, OAQ, within thirty (30) days of receipt of the test results. The Permittee shall take appropriate action to minimize excess emissions from the affected facility while the response actions are being implemented.
- (b) A retest to demonstrate compliance shall be performed within one hundred twenty (120) days of receipt of the original test results. Should the Permittee demonstrate to IDEM, OAQ that retesting in one-hundred and twenty (120) days is not practicable, IDEM, OAQ may extend the retesting deadline.
- (c) IDEM, OAQ reserves the authority to take any actions allowed under law in response to noncompliant stack tests.

The documents submitted pursuant to this condition do require the certification by the "responsible official" as defined by 326 IAC 2-7-1(34).

Record Keeping and Reporting Requirements [326 IAC 2-7-5(3)] [326 IAC 2-7-19]

C.14 Monitoring Data Availability [326 IAC 2-7-6(1)] [326 IAC 2-7-5(3)]

- (a) With the exception of performance tests conducted in accordance with Section C-Performance Testing, all observations, sampling, maintenance procedures, and record keeping, required as a condition of this approval shall be performed at all times the equipment is operating at normal representative conditions.
- (b) As an alternative to the observations, sampling, maintenance procedures, and record keeping of subsection (a) above, when the equipment listed in Section D of this approval is not operating, the Permittee shall either record the fact that the equipment is shutdown or perform the observations, sampling, maintenance procedures, and record keeping that would otherwise be required by this approval.
- (c) If the equipment is operating but abnormal conditions prevail, additional observations and sampling should be taken with a record made of the nature of the abnormality.
- (d) If for reasons beyond its control, the operator fails to make required observations, sampling, maintenance procedures, or record keeping, reasons for this must be recorded.
- (e) At its discretion, IDEM may excuse such failure providing adequate justification is documented and such failures do not exceed five percent (5%) of the operating time in any quarter.
- (f) Temporary, unscheduled unavailability of staff qualified to perform the required observations, sampling, maintenance procedures, or record keeping shall be considered a valid reason for failure to perform the requirements stated in (a) above.

C.15 General Record Keeping Requirements [326 IAC 2-7-5(3)][326 IAC 2-7-6]

- (a) Records of all required data, reports and support information shall be retained for a period of at least five (5) years from the date of monitoring sample, measurement, report, or application. These records shall be kept at the source location for a minimum of three (3) years. The records may be stored elsewhere for the remaining two (2) years as long as they are available upon request. If the Commissioner makes a request for records to the Permittee, the Permittee shall furnish the records to the Commissioner within a reasonable time.
- (b) Unless otherwise specified in this permit, all record keeping requirements not already legally required shall be implemented when the new or modified equipment begins normal operation.

C.16 General Reporting Requirements [326 IAC 2-7-5(3)(C)]

- (a) The source shall submit the attached Quarterly Deviation and Compliance Monitoring Report or its equivalent. Any deviation from permit requirements, the date(s) of each deviation, the cause of the deviation, and the response steps taken must be reported. This report shall be submitted within thirty (30) days of the end of the reporting period. The Quarterly Deviation and Compliance Monitoring Report shall include the certification by the "responsible official" as defined by 326 IAC 2-7-1(34).
- (b) The report required in (a) of this condition and reports required by conditions in Section D of this permit shall be submitted to:

Indiana Department of Environmental Management
Compliance Data Section, Office of Air Quality
100 North Senate Avenue, P. O. Box 6015
Indianapolis, Indiana 46206-6015
- (c) Unless otherwise specified in this permit, any notice, report, or other submission required by this permit shall be considered timely if the date postmarked on the envelope or certified mail receipt, or affixed by the shipper on the private shipping receipt, is on or

before the date it is due. If the document is submitted by any other means, it shall be considered timely if received by IDEM, OAQ on or before the date it is due.

- (d) Unless otherwise specified in this permit, all reports required in Section D of this permit shall be submitted within thirty (30) days of the end of the reporting period. All reports do require the certification by the "responsible official" as defined by 326 IAC 2-7-1(34).
- (e) The first report shall cover the period commencing on the date of issuance of this permit and ending on the last day of the reporting period. Reporting periods are based on calendar years.

SECTION D.1

FACILITY OPERATION CONDITIONS

Facility Description [326 IAC 2-7-5(15)]:

1. Thirty six (36) Main Burners, each at 1.622 MMBtu/hour and three (3) Auxiliary Burners, each at 0.1 MMBtu/hour in the preheat furnace section of the galvanizing line using natural gas rated at maximum total capacity of 58.7 MMBtu per hour. The NOx emissions are controlled by a Selective Catalytic Reduction / Selective Non-Catalytic Reduction (SCR/SNCR) Systems.
2. Forty four (44) Burners, each at 0.323 MMBtu/hour in radiant tube section with a maximum total capacity of 14.2 MMBtu per hour and option to replace non-conforming burners. The NOx emissions are controlled by SCR System.

The SCR/SNCR and SCR systems shall be referred to collectively as the SCR/SNCR system.

(The information describing the process contained in this facility description box is descriptive information and does not constitute enforceable conditions.)

Emission Limitations and Standards

D.1.1 Nitrogen Oxides (NOx) - Best Available Control Technology [326 IAC 2-2-3]

1. Pursuant to 326 IAC 2-2-3 and Agreed Order 2000-8861-A, the total nitrogen oxide(s) (NOx) emissions from the 36 Main Burners, each at 1.622 MMBtu/hour and 3 Auxiliary Burners, each at 0.1 MMBtu/hour in the preheat furnace section of the galvanizing line shall not exceed 2.9 pounds per hour which is equivalent to 50 pounds per million standard cubic feet of natural gas used on a twenty four (24) operating hour block average.
2. Pursuant to 326 IAC 2-2-3 and Agreed Order 2000-8861-A, the total nitrogen oxide(s) (NOx) emissions from the 44 Burners, each at 0.323 MMBtu/hour in the radiant tube section of the galvanizing line shall not exceed 2.8 pounds per hour which is equivalent to 200 pounds per million standard cubic feet of natural gas used on a twenty four (24) operating hour block average.
3. During the Startup and Shutdown period, the SCR/SNCR operations are exempt from complying with the above limits for this duration. The Permittee shall not produce more than incidental product during the Startup and Shutdown period from the Galvanizing line.
4. During the refractory lining drying period, the SCR/SNCR operations are exempt from complying with the above limits for this duration. The Permittee shall not produce more than incidental product during the refractory lining drying period from the Galvanizing line.

D.1.2 Particulate Matter (PM/PM-10) - Best Available Control Technology [326 IAC 2-2-3]

- (a) Pursuant to 326 IAC 2-2-3, the total PM and PM10 (where PM10 includes filterable and condensable components) emissions from the 36 Main Burners, each at 1.622 MMBtu/hour, 3 Auxiliary Burners, each at 0.1 MMBtu/hour in the preheat furnace section of the galvanizing line shall not exceed 1.9 and 7.6 pounds per million standard cubic feet of natural gas usage respectively and use good combustion practices.
- (b) Pursuant to 326 IAC 2-2-3, the total PM and PM10 (where PM10 includes filterable and condensable components) emissions from the 44 Burners, each at 0.323 MMBtu/hour in the radiant tube section of the galvanizing line shall not exceed 1.9 and 7.6 pounds per million standard cubic feet of natural gas usage respectively and use good combustion practices.
- (c) This limit in the permit accounts for PM10 emissions (where PM10 includes filterable and condensable components) from the combustion of natural gas only. The ammonia slip may cause elevated PM10 emissions. If in a latter stack test higher PM10 emissions are observed, the Permittee shall request for a review of this limit as part of the BACT determination.

D.1.3 Carbon Monoxide (CO) - Best Available Control Technology [326 IAC 2-2-3]

Pursuant to 326 IAC 2-2-3, the CO emissions from the 36 Main Burners, each at 1.622 MMBtu/hour, 3 Auxiliary Burners, each at 0.1 MMBtu/hour in the preheat furnace section and 44 Burners, each at 0.323 MMBtu/hour in the radiant tube section of the galvanizing line shall not exceed 84 pounds per million standard cubic feet of natural gas usage using good combustion practices.

D.1.4 Volatile Organic Compounds (VOC) - Best Available Control Technology [326 IAC 2-2-3]

Pursuant to 326 IAC 2-2-3, the VOC emissions from the 36 Main Burners, each at 1.622 MMBtu/hour, 3 Auxiliary Burners, each at 0.1 MMBtu/hour in the preheat furnace section and 44 Burners, each at 0.323 MMBtu/hour in the radiant tube section of the galvanizing line shall not exceed 5.5 pounds per million standard cubic feet of natural gas usage using good combustion practices.

D.1.5 Ammonia Limitations [326 IAC 2-1.1-5]

Pursuant to 326 IAC 2-1.1-5 (Air Quality Requirements), the ammonia emissions from the galvanizing line SCR systems stack shall not exceed twenty-five (25) ppmvd corrected to 15% O₂.

D.1.6 Preventive Maintenance Plan [326 IAC 2-7-5(13)]

A Preventive Maintenance Plan, in accordance with Section C - Preventive Maintenance Plan, is required for the control device.

Compliance Determination Requirements [326 IAC 2-7-6(1)] [326 IAC 2-7-5(1)]

D.1.7 Nitrogen Oxides (NO_x) [326 IAC 2-2-3]

Pursuant to 326 IAC 2-2-3 and Agreed order 2000-8861-A, the SCR/SNCR on preheat furnace and SCR on radiant tube section on the Galvanizing line shall be in operation and control emissions from the burners at all times when these are in operation. The SCR/SNCR systems shall be operated in a manner recommended by the manufacturer to minimize the NO_x emissions and ammonia slip.

D.1.8 Testing Requirements [326 IAC 2-7-6(1),(6)] [326 IAC 2-1.1-11]

1. Pursuant to Agreed Order 2000-8861-A, dated February 2, 2000 and subsequent amendment dated June 16, 2000, the Permittee has performed test on the SCR/SNCR exhausts on March 9, 2001 and has shown compliance with the limits in condition D.1.1. The test shall be repeated at least once every five (5) years from the date of this valid compliance demonstration for NO_x emissions from the SCR/SNCR exhaust. Testing shall be conducted in accordance with Section C- Performance Testing.
2. Pursuant to 326 IAC 3-5 the Permittee shall conduct a performance test, no later than one-hundred and eighty days (180) after the issuance of this permit or monitor installation, on the galvanizing line exhaust stack (1) in order to certify the continuous emission monitoring systems for NO_x.

D.1.9 Oxides of Nitrogen NO_x (SCR operation) [326 IAC 2-2]

- (a) Pursuant to 326 IAC 2-2 (PSD requirements), the Permittee shall determine optimum temperature of the catalyst bed during the stack test requirement in condition D.1.8 that demonstrates compliance with limits in condition D.1.1, as approved by IDEM.
- (b) From the date of the valid stack test, during a startup, the Permittee shall start urea injection in the SCR/SNCR unit to control NO_x emissions from the galvanizing line, as soon as the catalyst bed reaches the temperature determined in part (a) above.

Compliance Monitoring Requirements [326 IAC 2-7-6(1)] [326 IAC 2-7-5(1)]

D.1.10 Continuous Emission Monitoring

- (a) Pursuant to 326 IAC 2-5.1-3 and 326 IAC 2-2, the Permittee shall install a continuous emissions monitoring system or alternative monitoring plan as allowed under the Clean Air Act and 326 IAC 3-5-1(d).
- (b) The Permittee shall install, calibrate, certify, operate and maintain a continuous emissions monitoring system to monitor NOx emissions, in accordance with 326 IAC 3-5-2 through 326 IAC 3-5-7.
 - (1) The continuous emissions monitoring system (CEMS) shall measure NOx emissions rate in pounds per hour. The use of CEMS to measure and record the NOx hourly emission rates over a twenty-four (24) operating hour block averaging period is sufficient to demonstrate compliance with the limits established in the condition D.1.1. The source shall maintain records of emission rates in pounds per hour.
 - (2) The Permittee shall submit to IDEM, OAQ, within ninety (90) days after the monitor installation, a complete written continuous monitoring standard operating procedure (SOP), in accordance with the requirements of 326 IAC 3-5-4.
 - (3) The Permittee shall record the output of the system and shall perform the required record keeping, pursuant to 326 IAC 3-5-6, and reporting, pursuant to 326 IAC 3-5-7.
 - (4) The source may submit to the OAQ alternative emission factors based on the source's CEMS data (collected over one (1) season of operation; where a season is defined as the period of time from May 1 through September 30) and the corresponding site temperatures, to use in lieu of the vendor provided emission factors in instances of downtime. The alternative emissions factors must be approved by the OAQ prior to use in calculating emissions for the limitations established in this permit. The alternative emission factors shall be based upon collected monitoring and test data supplied from an approved continuous emissions monitoring system. In the event that the information submitted does not contain sufficient data to establish appropriate emission factors, the source shall continue to collect data until appropriate emission factors can be established.

Record Keeping and Reporting Requirements [326 IAC 2-5.1-3(e)(2)] [326 IAC 2-6.1-5(a)(2)]

D.1.11 Record Keeping Requirements

To document compliance with Condition D.1.1 the Permittee shall maintain records of the emission rate for NOx in pounds per hour.

D.1.12 Reporting Requirements

The Permittee shall submit the following information on a quarterly basis:

- 1. Records of excess NOx emissions (defined in 326 IAC 3-5-7 and 40 CFR Part 60.7) from the continuous emissions monitoring system. These reports shall be submitted within thirty (30) calendar days following the end of each calendar quarter and in accordance with Section C – General Reporting Requirements of this permit.
- 2. A quarterly summary of the CEMs data to document compliance with D.1.1 shall be submitted to the address listed in Section C – General Reporting Requirements, of this permit, within thirty (30) days after the end of the quarter being reported.

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE BRANCH
100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015
Phone: 317-233-5674
Fax: 317-233-5967**

**PART 70 OPERATING PERMIT
EMERGENCY OCCURRENCE REPORT**

Source Name: Nucor Steel
Source Address: RR 2, Box 311, County Road 400 East, Crawfordsville, IN 47933
Mailing Address: RR 2, Box 311, County Road 400 East, Crawfordsville, IN 47933
Permit No.: 107-14297-00038

This form consists of 2 pages

Page 1 of 2

9 This is an emergency as defined in 326 IAC 2-7-1(12)
The Permittee must notify the Office of Air Quality (OAQ), within four (4) business hours (1-800-451-6027 or 317-233-5674, ask for Compliance Section); and
The Permittee must submit notice in writing or by facsimile within two (2) days (Facsimile Number: 317-233-5967), and follow the other requirements of 326 IAC 2-7-16.

If any of the following are not applicable, mark N/A

Facility/Equipment/Operation:

Control Equipment:

Permit Condition or Operation Limitation in Permit:

Description of the Emergency:

Describe the cause of the Emergency:

If any of the following are not applicable, mark N/A

Page 2 of 2

Date/Time Emergency started:
Date/Time Emergency was corrected:
Was the facility being properly operated at the time of the emergency? Y N
Type of Pollutants Emitted: TSP, PM-10, SO ₂ , VOC, NO _x , CO, Pb, other:
Estimated amount of pollutant(s) emitted during emergency:
Describe the steps taken to mitigate the problem:
Describe the corrective actions/response steps taken:
Describe the measures taken to minimize emissions:
If applicable, describe the reasons why continued operation of the facilities are necessary to prevent imminent injury to persons, severe damage to equipment, substantial loss of capital investment, or loss of product or raw materials of substantial economic value:

Form Completed by: _____

Title / Position: _____

Date: _____

Phone: _____

A certification is not required for this report.

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE DATA SECTION**

**PART 70 SOURCE MODIFICATION
CERTIFICATION**

Source Name: Nucor Steel
Source Address: RR 2, Box 311, County Road 400 East, Crawfordsville, IN 47933
Mailing Address: RR 2, Box 311, County Road 400 East, Crawfordsville, IN 47933
Permit No.: 107-14297-00038

This certification shall be included when submitting monitoring, testing reports/results or other documents as required by this approval.

Please check what document is being certified:

- 9 Test Result (specify) _____
- 9 Report (specify) _____
- 9 Notification (specify) _____
- 9 Affidavit (specify) _____
- 9 Other (specify) _____

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

Signature:

Printed Name:

Title/Position:

Date:

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR QUALITY
COMPLIANCE DATA SECTION**

**PART 70 OPERATING PERMIT
QUARTERLY DEVIATION AND COMPLIANCE MONITORING REPORT**

Source Name: Nucor Steel
Source Address: RR 2, Box 311, County Road 400 East, Crawfordsville, IN 47933
Mailing Address: RR 2, Box 311, County Road 400 East, Crawfordsville, IN 47933
Permit No.: 107-14297-00038

Months: _____ to _____ Year: _____

Page 1 of 2

This report is an affirmation that the source has met all the requirements stated in this permit. This report shall be submitted quarterly based on a calendar year. Any deviation from the requirements, the date(s) of each deviation, the probable cause of the deviation, and the response steps taken must be reported. Deviations that are required to be reported by an applicable requirement shall be reported according to the schedule stated in the applicable requirement and do not need to be included in this report. Additional pages may be attached if necessary. If no deviations occurred, please specify in the box marked "No deviations occurred this reporting period".	
9 NO DEVIATIONS OCCURRED THIS REPORTING PERIOD.	
9 THE FOLLOWING DEVIATIONS OCCURRED THIS REPORTING PERIOD	
Permit Requirement (specify permit condition #)	
Date of Deviation:	Duration of Deviation:
Number of Deviations:	
Probable Cause of Deviation:	
Response Steps Taken:	
Permit Requirement (specify permit condition #)	
Date of Deviation:	Duration of Deviation:
Number of Deviations:	
Probable Cause of Deviation:	
Response Steps Taken:	

Permit Requirement (specify permit condition #)	
Date of Deviation:	Duration of Deviation:
Number of Deviations:	
Probable Cause of Deviation:	
Response Steps Taken:	
Permit Requirement (specify permit condition #)	
Date of Deviation:	Duration of Deviation:
Number of Deviations:	
Probable Cause of Deviation:	
Response Steps Taken:	
Permit Requirement (specify permit condition #)	
Date of Deviation:	Duration of Deviation:
Number of Deviations:	
Probable Cause of Deviation:	
Response Steps Taken:	

Form Completed By: _____

Title/Position: _____

Date: _____

Phone: _____

Attach a signed certification to complete this report.

Mail to: Permit Administration & Development Section
Office Of Air Quality
100 North Senate Avenue
P. O. Box 6015
Indianapolis, Indiana 46206-6015

Nucor Steel
RR 2, Box 311,
County Road 400 East,
Crawfordsville, IN 47933

Affidavit of Construction

I, _____, being duly sworn upon my oath, depose and say:
(Name of the Authorized Representative)

1. I live in _____ County, Indiana and being of sound mind and over twenty-one (21) years of age, I am competent to give this affidavit.
2. I hold the position of _____ for _____.
(Title) (Company Name)
3. By virtue of my position with _____, I have personal
(Company Name)
knowledge of the representations contained in this affidavit and am authorized to make
these representations on behalf of _____.
(Company Name)
4. I hereby certify that Nucor Steel RR 2, Box 311, County Road 400 East, Crawfordsville, IN 47933, has constructed the equipment in conformity with the requirements and intent of the construction permit application received by the Office of Air Quality on February 21, 2001 and as permitted pursuant to **Source Modification No. 107-14297-00038** issued on _____.

Further Affiant said not.

I affirm under penalties of perjury that the representations contained in this affidavit are true, to the best of my information and belief.

Signature

Date

STATE OF INDIANA)
)SS

COUNTY OF _____)

Subscribed and sworn to me, a notary public in and for _____ County and State of Indiana
on this _____ day of _____, 20_____.
My Commission expires: _____

Signature

Name (typed or printed)

Indiana Department of Environmental Management Office of Air Quality

Addendum to the Technical Support Document for a Part 70 Significant Source Modification requiring PSD Review

Source Background and Description

Source Name:	Nucor Steel
Source Location:	Route 2, Box 311, Crawfordsville, Indiana 47933
County:	Montgomery
SIC Code:	3312
Operation Permit No.:	107-7172-00038
Operation Permit Issuance Date:	Not Yet Issued
Significant Source Modification No.:	107-14297-00038
Permit Reviewers:	Gurinder Saini

On February 09, 2002, the Office of Air Quality (OAQ) had a notice published in the Journal Review, Crawfordsville, Indiana, stating that Nucor Steel, had applied for approval to modify the existing galvanizing line at the existing steel production source. The public notice also stated that OAQ proposed to issue the PSD permit for this operation and provided information on how the public could review the proposed approval and other documentation. Finally, the notice informed interested parties that there was a period of thirty (30) days to provide comments on the draft permit.

Written comments were received from Mr. Stephen Loeschner on March 4, 2002. Comments were also received from Nucor Steel. These comments and IDEM, OAQ responses, including changes to the permit (where language deleted is shown with strikeout and that added is shown in bold) are as follows:

General Description by the commentator

There appears to be three sizes of burners organized in two permitting text groups: 1) the Preheat Furnace Section ("PFS") has 39 burners of 2 sizes totalling approximately 58.692 million British Thermal Units ("BTU") / hour, identified in 14297 A.2(1) and D.1.1(1); and 2) the Radiant Tube Section ("RTS") has 44 burners totalling approximately 14.212 million BTU / hour, identified in 14297 A.2(2) and D.1.1(2).

Comment 1:

SNCR — Mass distraction

Throughout much of the Nucor Permit document package, "SNCR," Selective Non-Catalytic Reduction is mentioned. Frequently it is written within "SCR/SNCR." It appears that SNCR is not mentioned in the AO. It appears as if SNCR will not be used on the equipment listed. Absent good cause shown, SNCR should be amended out of the permit prior to issuance, as it seems to appear as only a distraction.

Response 1:

The commentator's observation that the SNCR systems are not used as a NO_x add-on control for the galvanizing line NO_x emissions is inaccurate. The NO_x emissions from the burners in the galvanizing line are controlled using a combination of SCR/SNCR systems. Both systems use aqueous urea injection to control NO_x emissions. The main difference in the Selective Catalytic

Reduction (SCR) and the Selective Non-Catalytic Reduction (SNCR) systems is the temperature of the inlet gases in the emissions control system at which the reaction converting NO_x to N₂ and H₂O occurs. This is in addition to the fact that as the name suggests, the SNCR system does not have a catalyst bed. The detailed description in this regard is available in Appendix C of the TSD.

In the SCR system, the temperature of inlet gases is in the range of 600 to 1000° F, depending upon the type of the catalyst used. In the case of the SNCR system the inlet gas temperature is in the range of 1600 to 2200° F. These are the optimum temperature ranges for the maximum reduction in the NO_x emissions using these controls. The Permittee has installed a high temperature catalyst for the SCR systems. The temperature of the exhaust gases from the galvanizing line usually in the range of 750-850°F, can have high temperature (in the range of 1600-1800° F depending upon the type and thickness of the steel being heated), before it reaches the catalyst bed. Therefore, the temperature in the zone before the catalyst bed will be in the optimum range for NO_x reduction in the presence of aqueous urea using SNCR process.

Thus the system can operate both as the SNCR and/or the SCR depending upon the type and thickness of the steel being heated. No change is required to the permit.

Comment 2:

Units

Society grants trespassing rights to polluters on the basis that in exchange for having our air sullied, some useful product will be produced. In re Nucor, the ultimate product is an amount of galvanized steel and a process intermediary is heat. To that end, the amount of pollutant mass should be expressed in terms of billions of BTU ("BBTU") rather than the variable millions of standard cubic feet of fuel gas ("scf"). The burner description throughout the Nucor Permit package seems to be consistently in terms of BTU and the issued Nucor permit and the Addendum to the Nucor Permit TSD should present BTU as well in re all of the NO_x and NH₃ matters.

Response 2:

The million British thermal unit per hour (MMBtu/hour) heat input for the natural gas combustion is related to the million standard cubic feet per hour (MMSCF/hour) of natural gas fed into the burners. This relationship is based on the heating value of the natural gas. In the AP-42¹, it is stated that, "...based on an average natural gas higher heating value of 1,020 Btu/scf. To convert from 1b/10⁶ scf to lb/MMBtu, divide by 1,020." Thus MMBtu/hour and MMSCF/hour can be calculated using the heating value for the natural gas fuel.

Thus, to be consistent with other similar type of determinations and to compare the limits with similar sources, the IDEM, OAQ decided to use the pounds/hour and pounds/MMSCF units for the limits for the various pollutants subject to the PSD review. The IDEM, OAQ believes that, the limits expressed in these units are adequate and convenient to show compliance with, by the Permittee. Therefore, no changes are required to the permit.

Comment 3:

Where are we now?

I'll identify the post-combustion "contained" mixed oxides of nitrogen ("NO_x") bearing pre-Pollution Control Equipment ("PCE") waste gas as "iwg" (inlet waste gas), and the post-PCE waste gas having had some NO_x removed by the PCE and bearing some undesired ammonia ("NH₃") as "owg" (outlet waste gas). Is the PFS presently mechanically able to be operated at approximately 58.7 million BTU / hour? Does it have "low NO_x" burners? Does it have SCR, SNCR, or neither?

¹ See Chapter 1.4, "Natural Gas Combustion" in the "Compilation of Air Pollutant Emission Factors, AP-42", July 98 edition

What is its iwg NOx pounds per BBTU? What is its raw iwg parts per million by volume ("ppmv") NOx (wet or dry)? What is its raw iwg or owg (specify) molecular oxygen ("O2") percentage by volume (specify wet or dry)? What is its owg NOx pounds per BBTU rate? What all tests have been performed on it? Are the burners to be replaced? Is SCR to be added? Is SNCR to be added?

Of note in the very confusing package is Section 3. of the Nucor Permit Technical Support Document ("TSD") Appendix C stating "Nucor has installed...", thus there should be rather detailed answers as to dates of first operation, dates of tests, results of tests, etc.

Response 3:

The natural gas burners in the preheat section are physically capable of operating at a combined heat input rate of 58.7 MMBtu/hour. The Permittee has to perform a tune-up on these burners to achieve the 15% increase in the heat input rate as stated in the permit. The preheat section temperature can reach up to 1800° F depending upon the type of steel being heated. Therefore, the control equipment for this section functions as the SNCR/SCR systems. The emission rate as guaranteed by the vendor, for these burners before add-on control is 0.17 lb/MMBtu. These burners are "low NOx" type for this type of application. The preheat section burners are not to be replaced as these meet the BACT level of control at 0.2 lb/MMBtu for this type of process, as demonstrated in appendix C of the TSD. To comply with the supplemental environmental project condition of the agreed order 2000-8861-A, the Permittee has installed a SNCR/SCR system to further control NOx emissions. The controlled NOx emissions from the preheat section will be limited to less than 50 lb/MMSCF as stated in the permit, by using the SNCR/SCR system.

No changes are made to any permit conditions.

Comment 4:

Is the RTS presently mechanically able to be operated at approximately 14.2 million BTU / hour? Does it have "low NOx" burners? Does it have SCR, SNCR, or neither? What is its iwg NOx pounds per BBTU? What is its owg raw ppmv NOx (wet or dry)? What is its iwg or owg (specify) raw O2 percentage by volume (specify wet or dry)? What is its owg NOx pounds per BBTU rate? What all tests have been performed on it? Are the 1995 burners to be replaced? Is SCR to be added? Is SNCR to be added?

Of note in the very confusing package is Section 2. of the Nucor Permit TSD Appendix C stating "Nucor has installed SCR...", thus there should be rather detailed answers as to dates of first operation, dates of tests, results of tests, etc.

Response 4:

The natural gas burners in the radiant tube section are physically capable of operating at a combined heat input rate of 14.2 MMBtu/hour. The Permittee has to perform a tune-up on these burners to achieve the 15% increase in the heat input rate as stated in the permit. The radiant tube section temperature does not reach up to 1800° F (this is explained in the comment by Nucor on the following pages). Therefore, the control equipment for this section functions as the SCR system only. The emission rate specified by the manufacturer for these burners, before add-on control, is 0.415 lb/MMBtu. These burners are not the "low NOx" type for this application. The Permittee proposed to install the SCR system, to control NOx emissions below the BACT level for the burners, in the Radiant Tube Section of the Galvanizing line. Therefore, these burners are not to be replaced, as using add-on controls these burners meet the BACT level of control at 0.2 lb/MMBtu for this type of process, as demonstrated in appendix C of the TSD. To comply with the conditions of the amendment to the agreed order 2000-8861-A, the Permittee installed the SCR system to control the NOx emissions.

No changes are made to any permit conditions.

Common Response to Comments 3 and 4

The stack test was performed on March 9, 2001 to determine the NO_x emissions from the Galvanizing line. The exhaust gases from the preheat section and the radiant tube section are combined and exhausted through one stack. For three one hour runs during this stack test the average NO_x emissions from the Galvanizing line stack after the use of add-on control (SCR/SNCR) were at 4.8 ppm at 15% O₂ and 1.26 pounds per hour. The exhaust gases had an average of 14.1% O₂ on dry volume % basis.

The average NO_x emission rate for the combined exhaust was 20.66 lb/MMSCF of natural gas burned. This emission rate shows compliance with the limits specified in this permit. Further as part of the requirements of this permit, the Permittee is required to install Continuous Emissions Monitoring System (CEMs) on the two sections of the Galvanizing line. As part of the requirements to get the CEMs certified, the Permittee is required to conduct a Relative Accuracy Test Audit (RATA) under 326 IAC 3-5-5. Therefore, the Permittee will be retesting this facility to show compliance with the limits in the permit.

Comment 5:

NO_x BACT

It would appear that the AOO and Nucor Permit D.1.7 essentially obligates that Nucor apply SCR to the PFS to reduce a nominal iwg x pounds NO_x per BBTU potential emission to a permit controlled owg y pound NO_x per BBTU emission. It would appear that the AOO did *not* mention Best Available Control Technology ("BACT"), a clever legal term wherein best does not mean best [see 42 USC 7479(3) and 40 CFR 52.21(b)(12)], in re the PFS NO_x.

It would appear that the AOA and Nucor Permit D.1.7 essentially obligates that Nucor apply SCR to the RTS to reduce a nominal iwg 407 pounds NO_x per BBTU (at 1,020 BTU / scf) potential emission to an owg 196.1 pounds NO_x per BBTU floor level with a provision that a subsequent BACT determination may result in the imposition of a lower owg NO_x limit.

Then, DEM set the Nucor Permit D.1.1(1) PFS owg BACT level at 49.02 pounds NO_x per BBTU and the Nucor Permit D.1.1(2) RTS owg BACT level at 196.1 pounds NO_x per BBTU. That is an owg average of $(49.02 \times 58.692 + 196.1 \times 14.212) / (58.692 + 14.212) = 77.69$ pounds NO_x per BBTU.

The pair of owg BACT determinations tend to impeach themselves for with similar uses of natural gas for metal process heating to be subjected to BACT at the same time to produce differing BACT levels of 4:1 indicates a rather arbitrary and capricious decision wherein there was no environmental weight in the decision, and wherein the economic factors were random at best.

For DEM to arrive at that 4:1 conclusion, DEM would have to show that the concentration of NO_x by volume in the RTS iwg was no more than a quarter the concentration of NO_x by volume in the PFS iwg. There is nothing whatsoever in the Nucor Permit TSD indicating that the RTS iwg was or had to be highly dilute, thus making SCR applied to RTS far less effective than SCR applied to PFS.

Response 5:

The preheat section and radiant tube section are two separate areas in the galvanizing line. These sections are equipped with two separate kinds of burners depending upon the heating requirements. The preheat section is equipped with "direct fired burners" where as the radiant tube section is equipped as the name suggests with "radiant tube burners".

The two types of burners are specific to the type of process and are typically used in this type of application in a galvanizing line. As explained earlier, where as the burners in the preheat section are low-NOx type which are rated at 170 lb/MMSCF of natural gas burned. The burners installed in the radiant tube section are not low-NOx type. This is because as described in the Agreed Order 2000-8861-A, the radiant tube burners' NOx emissions are rated at 415 lb/MMSCF of natural gas burned. Newer burners with NOx emission rates as low as 200 lb/MMSCF of natural gas burned are available and are classified as low-NOx burners. As per the original agreed order, the Permittee was required to replace the older radiant tube burners with the low-NOx type radiant tube burners. In addition it is shown in the Appendix- C of the TSD, the low-NOx burners with the NOx emission rate of 200 lb/MMSCF or less of natural gas burned is the BACT for this process.

In a letter in the May of 2000, the Permittee stated that, in place of replacing the burners, it would install a SCR system to control NOx emissions from the radiant tube section burners to the level below 200 lb/MMSCF of natural gas burned as established BACT.

As part of the BACT review, the cost per ton of NOx removed using SCR system is considered economically infeasible to control NOx emissions from this application as shown in the Appendix C of the TSD. The next control technology available is the low-NOx burners to control NOx emissions to 200 lb/MMSCF of natural gas burned. The Permittee had already installed the radiant tube burners with the higher NOx emission rate (415 lb/MMSCF) as detailed in the TSD for this permit. The Permittee stated that, it would be more expensive to retrofit radiant tube section burners with low-NOx burners, than to install the SCR system and control the NOx emissions, to the level below 200 lb/MMSCF of natural gas burned (as achieved using low-NOx burners). The SCR/SNCR system will function with minimum control efficiency of 50-75% for NOx emissions.

The IDEM, OAQ, agreed that in place of retrofitting with the low-NOx burners, the Permittee could install the SCR system to control the NOx emissions (to the BACT level) from the radiant tube section of the galvanizing line. This is detailed in the amendment to the Agreed Order 2000-8861-A and the TSD for this permit.

The differences in the NOx emission rates from the two sections are the result of the two different types of the burners being used. The manufacturer of the burners "Bloom Engineering Company" website at <http://www.bloomeng.com/> explains the essential differences in the two type of burners and states the lowest NOx emissions rate achievable for the two types. In addition the operation of the SCR is affected by the fluctuations in the exhaust gas temperature. The Radiant Tube Section exhaust can reach temperature higher than the optimum range for the SCR catalyst but still below the optimum range of SNCR. For this condition, the Permittee has to protect the Catalyst from meltdown by mixing colder ambient air to the exhaust stream. As this causes a dilution of the NOx concentration in the radiant tube section exhaust gases, the SCR efficiency of NOx control is decreased. This condition is not present in the preheat section of the galvanizing line, because the temperature is increased further to continue the operation in the SNCR mode. Therefore, it is not unusual to have two different controlled NOx emission rates post SCR systems from the two sections.

No changes are made to any permit conditions.

Comment 6:

The AO represented a minimum performance, it did not set owg BACT. The AO did set aside the matter of the 40 CFR 52.21(b)(23)(i) 40 tons per year ("tpy") NOx significance, and the AO did set aside whatever lesser NOx significance that may be drawn from the IAC. Of note is the AO year 2000 consummation and that contained therein are 326 IAC 2-1 references. 326 IAC 2-1 is believed to have been repealed in large part in 1998, as documented at 22 IR 1072. There was an expectation that the AO, as signed, would have been written (edited, amended) to reflect the law, regulation, and rule applicable at the time. Thus the fact that the Limited Potential To Emit ("LPTE") of $(49.02 \times 58.692 + 196.1 \times 14.212) / 1,000 \times 8,768 / 2,000 = 24.83$ tpy NOx— an

interesting coincidence in not exceeding 25 tpy— is not relevant.

The fact is, Nucor signed the AO obligating BACT for RTS owg, and DEM is obligated to apply BACT, not create a synthetic minor modification by accepting something less than BACT, for RTS owg.

Response 6:

As described in the TSD, this modification was part of a PSD major modification and therefore, is being reviewed pursuant to 326 IAC 2-2 and 40 CF 52.21 (PSD). Therefore, the limit represents the BACT and is not intended to be a limit to maintain a minor status for this modification.

No changes are made to any permit conditions.

Comment 7:

BACT for natural gas combustion, where SCR is applied, is not 196.1 pounds NOx per BBTU, it is not 77.69 pounds NOx per BBTU, and it is not 49.02 pounds NOx per BBTU. Indeed, BACT for natural gas combustion, where SCR is applied, is less than 10 pounds NOx per BBTU.

Adequate proof of that fact is found in Condition D.1.3(a)(1) of DEM's issued permit 141- 14198-00543 [ftp://ftp2.ai.org/pub/idem/oam/14198f.pdf](http://ftp2.ai.org/pub/idem/oam/14198f.pdf) ("14198" incorporated herein by reference) having a limit of 18.7 pounds NOx limit for a 14198 Condition A.2(a) input of 2.071 BBTU leading to a 9.03 pound NOx per BBTU conclusion.

Response 7:

The permit number 141-14198-00543 was issued by the IDEM, OAQ to the Allegheny Energy Supply Co.LLC. This permit is to construct and operate two natural gas fired combined cycle and two simple cycle combustion turbines to generate electricity. The combined cycle combustion turbine (which are referred by the commentator above) at this plant use a state of the art "Dry-Low NOx combustor" that generate very low NOx emissions. The exhaust gas from the turbine is further treated using a SCR system to reduce NOx emissions. The combustion equipment and the environment in a turbine are in no way comparable to the burners being used in the galvanizing line. The commentator's claim that the BACT for all natural gas combustion units (irrespective of the application) using the SCR system as control, to have same BACT level of emission rate is arbitrary and unscientific. The NOx concentration in the exhaust gases of any SCR control system is dependent upon inlet NOx concentration. The SCR inlet NOx concentration in turn depends on the type of equipment being controlled. The commentator's presumption that without the SCR system, the galvanizing line at a steel mill and a natural gas fired Frame type combined cycle combustion turbine at a power plant, should have same exhaust gas characteristic is unrealistic and irrational.

In this addendum, IDEM, OAQ will not emphasize in detail the differences between two type of processes, but would like to mention that the combustion environment, in a natural gas fired combined cycle combustion turbine is extremely controlled and combustion chambers are enclosed and are supplied with controlled combustion air and fuel. These conditions do not exist for the burners in the galvanizing line.

No changes are made to any permit conditions.

Comment 8:

The PFS and RTS natural gas combustion iwg's are among the lowest sulfur and lowest particulate NOx bearing hot waste gas streams within the whole Nucor facility. Thus, catalyst poisoning and fouling are rather small issues. Were any measurements (or engineering

estimates) made on the PFS and or RTS iwg as to its relative catalyst poisoning and fouling potential? What were the results and or calculations?

Response 8:

The catalyst poisoning or fouling is not a relevant issue to the BACT analysis for the galvanizing line other than considering replacement cost, per the design life recommended by the manufacture. The decrease in the SCR control efficiency is more attributable to fluctuation in the inlet gas temperature than to catalyst fouling. The Permittee will be required to maintain the catalyst performance as part of the preventive maintenance plan for this control device.

No changes are made to any permit conditions.

Comment 9:

The galvanizing process is rather continuous, thus the temperatures of the PFS and RTS iwg is quite uniform.

Yes, the Nucor iwg is somewhat different in character than the 14198 iwg. But those differences do not rise above perhaps a 20% cushion for Nucor. There appears nothing in the record technically indicative of why owg BACT for both the PFS and RTS has not been set at 11 or less pounds NOx per BBTU.

For example, to make its case for a 49.02 pound NOx per BBTU PFS owg BACT determination, DEM would have to show a technical basis that the concentration of NOx by volume in PFS iwg was no more than 19% of the concentration of NOx by volume in 14198 iwg.

Absent a very sound technical foundation of the RTS raw NOx iwg concentration being extremely dilute or a technically strong showing of extraordinary catalyst fouling or poisoning iwg potential, the 196.1 pound NOx per BBTU BACT determination for RTS owg is Ludicrous (capital "L"). It is a gross abuse of the strength of the AO, and it must be revised to 11 or less pounds NOx per BBTU prior to permit issuance (or whatever the legal term is called for granting a retroactive permit washing away the guilt associated there with).

Absent a very sound technical foundation of the PFS raw NOx iwg concentration being very dilute or a technically strong showing of catalyst fouling or poisoning iwg potential, the 49.02 pound NOx per BBTU BACT determination for PFS owg is ludicrous (lower case "l"). It is a gross abuse of the implied strength of the AO, and it must be revised to 11 or less pounds NOx per BBTU prior to permit issuance (or whatever the legal term is called for granting a retroactive permit washing away the guilt associated there with).

Response 9:

The commentator's observation that the galvanizing line process is rather continuous is unrealistic and unfounded. The galvanizing process is intermittent where a roll of steel is brought into the line area and then is loaded onto the rollers and dipped through the zinc pot. In addition to this, the steel being heated can have various grades of thickness, which can result in higher heat requirement for thicker steels. This in turn can cause increased NOx emissions from the burners.

The commentator's attributing 20% cushion to the difference in combustion turbine and galvanizing line is completely speculative. The IDEM, OAQ has used reliable information in the form of manufacturer's specification for these burners, to base the BACT analysis for the galvanizing line. As already explained in previous responses, the comparison of the galvanizing line emissions to the combustion turbine emissions is highly inappropriate and baseless. There is no technical basis to show that the NOx emissions post SCR control can meet 0.011 lb/MMBtu of heat input. While evaluating the BACT analysis, IDEM, OAQ assumed a realistic 75% NOx

reduction by the application of the SCR, which has been observed at other similar type of applications. For the SCR to achieve the NOx emission rate of 11.22 lb/MMSCF of natural gas burned from radiant tube section from inlet NOx rate of 415 lb/MMSCF of natural gas burned, the SCR has to operate at 97.3% control efficiency. This high SCR NOx control efficiency is not observed, even in the most stable operation of a base load frame type combined cycle natural gas fired combustion turbines. There the average NOx control efficiency for the SCR varies from 80 to 90%. Therefore, 75% control efficiency assumed for the SCR application on the galvanizing line is realistic and practical.

No changes are made to any permit conditions.

Comment 10:

The TSD is *not* the Permit

Section 2. of the Nucor Permit TSD Appendix C speaks of shall in re the RTS SCR NOx control efficiency, yet the Nucor Permit draft appears silent. Permit conditions for both PFS and RTS SCR removal percentage performance must be added prior to issuance.

Response 10:

The SCR control efficiency in the Appendix C of the TSD was used to establish the NOx emission rate in lb/MMSCF of natural gas burned, post add-on control, from the radiant tube section. The emission rate corresponding to a minimum level of control efficiency of SCR has been included in the permit. The Permittee shall meet this emission rate to show compliance with the BACT level of control for NOx emissions. Therefore, adding control efficiency percentage limitation in the permit will be redundant and burdensome to show compliance with. No changes are made to any permit conditions.

Comment 11:

CEM is *intrinsically* integral

The admission of reagent (anhydrous NH3, aqueous NH3, aqueous urea, etc. "reagent") into SCR systems is controlled by a computer acting on several sensor variables. As a minimum, in an environmentally well-regulated SCR system, the sensors would likely include: 1) catalyst temperature, 2) iwg raw NOx unit mass per unit sample volume ("um/uv"), 3) owg raw NOx um/uv, 4) iwg or owg volume flow per unit time, 5) owg NH3 um/uv, 6) iwg or owg O2 um/uv, and 7) iwg or owg H2 um/uv. From those sensors, a number of other factors can be calculated including: 1) owg mass per unit time NOx and NH3 emissions, 2) aggregation of owg NOx and NH3 mass over long times, 3) SCR removal efficiency, and 4) owg NOx and NH3 emission concentration expressed in a standardized form, such as ppmv on a dry basis adjusted to 15% O2 ("ppmvda").

It would be irresponsible to admit reagent where knowledge of any of the following was unknown: 1) catalyst temperature, 2) presence of NOx in reactable concentration, and 3) flow.

It would be irresponsible to continue to admit reagent where knowledge of any of the following was unknown: 1) owg NOx concentration (i.e. was the system working), and 3) owg NH3 concentration (i.e. had something failed producing an NH3 surplus).

Thus responsible SCR operation includes essentially all of the sense elements needed for Continuous Emission Monitoring ("CEM") of NOx and NH3. DEM must incorporate those obligations into the permit for both PFS and RTS prior to issuance. Nucor Permit D.1.10 is silent in re NH3 CEM.

Response 11:

The commentator's presumption that the Continuous Emissions Monitoring (CEM) system for the

NOx emissions are “intrinsically integral” is incorrect. The SCR system is equipped with the process control system, which may or may not be a CEM.

The Permittee shall install a Continuous Emission Monitoring System for NOx emissions, which shall meet the regulatory requirements and shall be used to control urea injection flow based on the NOx concentration in the exhaust gases. The urea flow will vary in accordance with increase or decrease in NOx concentration in the exhaust gases. The ammonia CEMs are not common at this time and IDEM, OAQ is not aware of any Sources in Region 5 States of US EPA using CEMs to show compliance with ammonia slip limitation. The installation of ammonia CEMs will be an unnecessary economic burden on the Source and does not yield any significant environmental benefits.

It is expected that the Permittee shall operate the SCR system in accordance with the requirements or the permit and practices recommended by the manufacturer. The continuous emission monitoring system for the NOx emissions will provide accurate information to establish if the Permittee has been complying with the applicable limits. The Permittee may rely on the parameters listed by the commentator and any other parameters, to operate the SCR to best of its ability and performance level to achieve desired NOx emissions reductions.

No changes are made to any permit conditions.

Comment 12:

NH3 — Cure worse than disease

To convert NOx into molecular nitrogen, O₂, and water, a reagent is added to the pollutant stream as it enters the SCR PCE. Whether the reagent is anhydrous NH₃, or something less intrinsically hazardous to transport and store, such as aqueous urea, is immaterial to the fact that with varying operations of the SCR PCE, including *normal* operation, some NH₃ will be emitted into the air.

The Nucor Permit D.1.5 allowance for PFS and RTS owg of 25 ppmvda NH₃ emission is entirely unacceptable.

While NH₃ is not mentioned in the federal PSD Regulation, 40 CFR 52.21, the PM₁₀ BACT requirement implicitly commands DEM to consider all that which contributes to PM₁₀. Thus it is clear error that DEM has not evaluated the harm of Nucor emitting NH₃, and it is clear abuse of discretion by DEM by not establishing 40 CFR 52.21(b)(17) federally enforceable (“federally enforceable”) permit limits for NH₃.

That is not to say that DEM was not aware of that relationship or that DEM did not mention it. Indeed Nucor Permit D.1.2(c) has comment on such. However in sum, the Nucor Permit package has no technical discussion as to why an absurdly high 25 ppmvda NH₃ emission limit is “needed” to achieve an abysmal 75% SCR NOx reduction efficiency.

The Nucor Permit D.1.5 “limit” appears uncontrolled by any test. A once, once every 5 year, or annual stack test (with options for additional tests) does not demonstrate compliance on a more or less continuous basis as required to be considered federally enforceable.

In the use of SCR to control NOx, there are many attributes that can be adjusted to reduce NH₃ owg emission; some of them are: 1) a greater catalyst area can be presented, 2) a more active catalyst can be presented, 3) the reactants can be caused to reside at the catalyst surface for a greater time, 4) the temperature can be better controlled to achieve greater reaction, and 5) the admission of reagent can be more carefully controlled to achieve less excess. It appears that DEM did nothing in re any of those methods.

NH₃ owg emissions restricted to no more than 2 ppmvda by permit limits and CEM’s are readily achievable. Prior to issuance, DEM must as a minimum incorporate federally enforceable 2

ppmvda NH₃ rate limits and CEM's for NH₃.a In the event DEM technically demonstrates NH₃ owg CEM infeasibility [see p. H.6, II.C., para. 2 of the EPA October 1990 *New Source Review Workshop Manual* (incorporated herein by reference) "Where continuous quantitative measurements are infeasible...."] then DEM must incorporate the following into the permit in re NH₃ owg prior to issuance: 1) four stack tests required per 365-day rolling period, with no more than 110 days between consecutive tests; 2) notice that there will be a presumptive number of violations corresponding to the number of days of testing tardiness; 3) notice that a test failure will constitute a presumptive number of violations corresponding to the number of days between the failing and the prior passing test; and 4) reporting requirements of the test results and of calculated quantities emitted from the time of the past test to the time of the reported test.

Further, NH₃ is a poisonous gas designated in Appendix A to 40 CFR 355 as an "Extremely Hazardous Substance" ("EHS") as a result of it having been found to merit continued designation as such following initially being listed in 42 USC 7412(r)(3). DEM must identify the NH₃ PTE by Nucor and the LPTE as controlled by the permit.

Response 12:

As explained earlier, the galvanizing line is not a continuous process. There are large flow rate and temperature variations in the exhaust stream of a galvanizing line. These fluctuations will cause an elevated ammonia slip till the system stabilizes at a new performance level. Aqueous urea usage is an additional cost to the Permittee for operating the SCR/SNCR systems on the galvanizing line.

The IDEM, OAQ, cannot assign an arbitrary [2 ppmvd ammonia slip] emission limit to the galvanizing line emissions. With respect to the contribution of ammonia slip to increased PM₁₀ emissions, the Environmental Appeals Board (EAB) in an order denying the review¹ of a permit stated, "At the outset, we find that Petitioner's argument that emitted ammonia will form PM₁₀ is purely speculative in nature." Due to limited information availability the Board concluded that it would not overturn a permit provision based on a speculative argument. The OAQ, IDEM has included a provision in the condition D.1.2 (c) of the permit to revise the PM₁₀ limit for the galvanizing line stack in the case that ammonia slip is found to be a precursor to the PM₁₀ emissions. At this time due to lack of verifiable information in this regard, this provision is added to the permit.

In a PSD permit, the emission limits for the various pollutants are established based on a rigorous BACT analysis. There is very little information available on use of SCR to control NO_x emissions from a galvanizing line. The commentator's speculation that ammonia slip of 2 ppmvd and using CEMs is completely unsupported as there are no other known facilities with this limitation and requirements.

In the absence of reliable and comprehensive information regarding the ammonia slip performance of SCR/SNCR systems on the other galvanizing lines or other similar applications, the IDEM, OAQ is forced to base the emission limitation on the manufacturer's recommendation for these systems. Keeping in mind the concerns expressed by the commentator about excess ammonia slip, IDEM, OAQ has revised condition D.1.7 as follows:

D.1.7 Nitrogen Oxides (NO_x) [326 IAC 2-2-3]

Pursuant to 326 IAC 2-2-3 and Agreed order 2000-8861-A, the SCR/SNCR on preheat furnace and SCR/SNCR on radiant tube section on the Galvanizing line shall be in operation and control emissions from the burners at all times when these are in operation.
The SCR/SNCR systems shall be operated in a manner recommended by the

¹ See "Three Mountain Power, LLC", PSD Appeal No. 01-05, Order denying review, before Environmental Appeals Board, decided May 30, 2001.

manufacturer to minimize the NOx emissions and ammonia slip.

The commentator's argument about requiring more frequent stack testing and determining extent of presumptive violations based on the failed stack test are not based on any regulation and are beyond the scope and provisions of this permit. The OAQ, IDEM has the authority to request additional stack testing as determined to be necessary to demonstrate compliance with an applicable requirement. One possible scenario is when the quarterly NOx reports indicated that a unit is not operating properly, OAQ could request additional ammonia testing to confirm the compliance status of the unit.

Comment 13:

Multiple limits

While Nucor will no doubt feel it burdensome, excessive, and unnecessary, there should be three (3) simultaneous limits applied to determine NOx compliance on a more or less continuous basis.

First, an owg pound NOx mass per BBTU limit must be imposed so as to have the damage to the air be related to the "value" of the process heat generated— something distinctively less than 49 pounds NOx per BBTU for both PFS and RTS.

Second, a minimum percentage (unit less) mass NOx reduction ratio from iwg to owg limit must be imposed $((1 - (\text{in} - \text{out}) / \text{in}) \times 100)$ — something distinctively greater than 75% for both PFS and RTS— as, at even 80%, one wonders of the value received v. the costs incurred.

Third, a maximum owg NOx ppmvda concentration limit must be imposed to obligate the use of the PCE to its reasonable control potential— something less than 2.5 ppmvda NOx for both PFS and RTS.

And, of course, there is the obligation to not make matters worse. Thus: an owg pound NH3 mass per BBTU limit must be imposed so as to have the damage to the air be related to the "value" of the process heat generated— something less than 6 pounds NH3 per BBTU for both PFS and RTS. And a maximum owg NH3 ppmvda concentration limit must be imposed to obligate the use of the PCE to its reasonable control potential— something not more than 2.0 ppmvda NH3 for both PFS and RTS.

Response 13:

The commentator's presumptive BACT limitations (2.5 ppm for NOx and 2.0 ppm for ammonia emissions based on BACT for a gas turbine) have been shown to be not applicable to the galvanizing application in this permit. The NOx emission limit in pounds per million cubic feet of natural gas burned and in pounds per hour is adequate to show compliance with BACT level of control for this application. No changes are made to any permit conditions.

On March 08, 2002, Dave Sulc of Nucor Steel submitted comments on the draft significant source modification 107-14297-00038. These comments and IDEM, OAQ responses to the same are presented in the following pages. The permit changes where texts deleted are shown with a strikeout and that added are shown in bold.

Comment 1:

Draft Part 70 Significant Source PSD Modification Permit

Section A.2

Nucor would like to clarify the application of the SCR/SNCR technology. On the preheat section, exhaust temperatures are frequently high enough that selective non-catalytic reduction (SNCR)

will occur in addition to selective catalytic reduction (SCR). The system on the preheat section of the galvanizing line is thus best referred to as a combined SCR/SNCR system, as IDEM has done throughout.

On the radiant tube section, further analysis suggests that SNCR temperatures will not usually be achieved. Accordingly, the system applied to the radiant tube section is best referred to as an SCR system. Nucor recommends that Condition A.2, (2) be revised to state that emissions are controlled by an SCR system.

For clarification, it may be appropriate to add a new sentence: "The SCR/SNCR and SCR systems shall be referred to collectively as the SCR/SNCR system."

Section D.1

Under Facility Description, please revise #2 to state emissions are controlled by an SCR system.

Response 1:

The condition A.2 (2) and facility description in the box in Section D.1 are modified as follows:

A.2 Emission Units and Pollution Control Equipment Summary [326 IAC 2-7-4(c)(3)] [326 IAC 2-7-5(15)]

This modification to a stationary source is approved to construct and operate the following emission units and pollution control devices:

1. Thirty six (36) Main Burners, each at 1.622 MMBtu/hour and three (3) Auxiliary Burners, each at 0.1 MMBtu/hour in the preheat furnace section of the galvanizing line using natural gas rated at maximum total capacity of 58.7 MMBtu per hour. The NOx emissions are controlled by a Selective Catalytic Reduction / Selective Non-Catalytic Reduction (SCR/SNCR) Systems.
2. Forty four (44) Burners, each at 0.323 MMBtu/hour in radiant tube section with a maximum total capacity of 14.2 MMBtu per hour and option to replace non-conforming burners. The NOx emissions are controlled by SCR/SNCR Systems.

The SCR/SNCR and SCR systems shall be referred to collectively as the SCR/SNCR system.

SECTION D.1 FACILITY OPERATION CONDITIONS

Facility Description [326 IAC 2-7-5(15)]

1. Thirty six (36) Main Burners, each at 1.622 MMBtu/hour and three (3) Auxiliary Burners, each at 0.1 MMBtu/hour in the preheat furnace section of the galvanizing line using natural gas rated at maximum total capacity of 58.7 MMBtu per hour. The NOx emissions are controlled by a Selective Catalytic Reduction / Selective Non-Catalytic Reduction (SCR/SNCR) Systems.
2. Forty four (44) Burners, each at 0.323 MMBtu/hour in radiant tube section with a maximum total capacity of 14.2 MMBtu per hour and option to replace non-conforming burners. The NOx emissions are controlled by SCR/SNCR Systems.

The SCR/SNCR and SCR systems shall be referred to collectively as the SCR/SNCR system.

(The information describing the process contained in this facility description box is descriptive information and does not constitute enforceable conditions.)

The IDEM, OAQ, acknowledges this change in this addendum to the TSD itself also. The TSD for

the draft permit is not modified as it reflects the background information for the draft permit. All changes in the TSD are documented in the addendum to the TSD.

Comment 2:

Section D.1.5

While 326 IAC 2-1.1-5 sets forth the circumstances whereby the commissioner shall not issue a permit, it does not provide IDEM with authority to impose substantive requirements (except for performing an air quality analysis to demonstrate compliance with the NAAQS). Accordingly, because there is no underlying applicable requirement for this condition, Section D.1.5 should be deleted in its entirety. In no case should the limit be lowered beyond what the manufacturer will guarantee (e.g., 25 ppmv), because there is no credible information in the record demonstrating that a lower limit is consistently achievable by this system.

Response 2:

The ammonia emissions are a collateral environmental impact of employing SCR or SNCR system to control NOx emissions and have been regulated by various agencies. The NSR workshop manual by US EPA¹ stated that, "In limited other instances, though, control of regulated pollutant emissions may compete with control of toxic compounds, as in the case of certain selective catalytic reduction (SCR) NOx control technologies. The SCR technology itself results in emissions of ammonia, which increase, generally speaking, with increasing levels of NOx control. It is the intent of the toxics screening in the BACT procedure to identify and quantify this type of toxic effect. Generally, toxic effects of this type will not necessarily be overriding concerns and will likely not to affect BACT decisions. Rather, the intent is to require a screening of toxics emissions effects to ensure that a possible overriding toxics issue does not escape notice."

The IDEM, OAQ has limited the ammonia slip emissions to 25 ppmvd as recommended by the equipment manufacturer. Information about the ammonia slip from the other galvanizing line using SCR system to control NOx emissions is not available at this time.

The IDEM, OAQ uses the authority under 326 IAC 2-1.1-5 to "protect public health" to minimize the ammonia slip emissions from the SCR unit because this regulation prohibits issuance of any permits which will not protect the public health.

Comment 3:

Section D.1.7

Please revise "SCR/SNCR" on the radiant tube section to "SCR". For clarification, it may be appropriate to add a new sentence: "The SCR/SNCR and SCR systems shall be referred to collectively as the SCR/SNCR system."

Section D.1.7 incorrectly identifies the authority for the imposition of SCR/SNCR as the best available control technology (BACT) requirements under 326 IAC 2-2-3. As Nucor previously commented, the proposal to install the SCR/SNCR systems is part of Agreed Order 2000-8861-A and not a requirement pursuant to 326 IAC 2-2-3. This point is clearly made in the accompanying BACT determination, which clearly found that BACT is low-NOx burners. Accordingly, identifying 326 IAC 2-2-3 misstates the BACT determination, is misleading to the public and to future permit reviewers, and probably constitutes reversible error.

¹ See Chapter B, "Best Available Control Technology", in the , "New Source Review Workshop Manual", by US EPA, Draft - October 1990.

Nucor acknowledges that the SCR/SNCR system it is installing is in lieu of the BACT determination and hence is subject to PSD permit control. Nucor has no objection to stating that the SCR/SNCR system is being voluntarily installed as an additional control beyond BACT. Nevertheless, Nucor believes that the permit and TSD should clearly reflect that BACT is 0.2 lbs NOx/MMBtu and that the SCR/SNCR system is an additional, beyond-BACT control measure that is being used to achieve BACT-equivalent (or better) limits. Therefore, if the OAQ will not delete the reference to 326 IAC 2-2-3 in its entirety, Nucor requests that the reference be revised to 326 IAC 2-2 to clarify that while the SCR/SNCR systems were imposed under PSD, they are not BACT.

Response 3:

The BACT analysis for the galvanizing line in the Appendix C of the TSD shows, that the BACT for the NOx emissions from the burners in the radiant tube section is the low-NOx burners, with NOx emission rate less than 200 pounds per million cubic feet of natural gas burned. The Permittee decided not to retrofit the burners on the galvanizing line with low-NOx burners as this cost was excessive. In its place the Permittee decided to install a SCR system to control NOx emissions below the level (200 lb/MMSCF), if the low-NOx burners were used.

The Permittee's argument that the BACT determination to use SCR system to control NOx emissions from the radiant tube section of the galvanizing line is misleading to the public and to future permit reviewers is unfounded. The BACT discussion in the Appendix C of the TSD details the circumstances for the recommendation to install the SCR/SNCR systems on the preheat furnace and radiant tube sections of the galvanizing line. The SCR/SNCR system on the preheat furnace section is required by the agreed order A 2000-8861-A as a supplemental environmental project. The radiant tube section has conventional radiant tube burners that have NOx emission rate of 415 lb/MMSCF of natural gas burned. During the evaluation of the BACT determination for the galvanizing lines at other similar sources, the IDEM, OAQ determined that the NOx emission rate of 200 lb/MMSCF of natural gas burned using dry low NOx burners is the BACT. As the Permittee decided to install the SCR to control (even when the cost per ton NOx removed was excessive) the NOx emissions to a limit below 200 lb/MMSCF of natural gas burned, the SCR is the BACT determination. It will be inaccurate to state that the SCR is additional, beyond BACT control, because the Permittee did not install the low-NOx burners in the radiant tube section.

The agreed order A 2000-8861-A, requires the source to obtain a Prevention of Significant Deterioration permit under 326 IAC 2-2, and comply with the requirements of the BACT requirements for NOx emissions from the burners. Therefore, as part of the resolution of the agreed order, the Permittee is required to comply with the conditions of this permit.

The condition D.1.7 of the permit is modified as shown in response to earlier comment.

Comment 4:

Section D.1.8(2)

Nucor objects to the requirement to stack test "to certify the continuous emissions monitoring systems for NOx." As Nucor has repeatedly commented, the imposition of a CEMS is unwarranted, arbitrary and capricious. Nucor does not object to a stack test to calibrate the SCR/SNCR process control system so that it can be used to provide emissions data as part of Nucor's demonstration of compliance. Nucor's objections to the CEMS and the basis for them are set forth in the letter from Nucor's attorneys dated November 6, 2001, which Nucor hereby reincorporates and resubmits, and by the additional discussion under Section D.1.10 below.

Response 4:

The letter from "The TESTLaw Practice Group", the attorney's for the Nucor corporation, relates

to the authority of the IDEM, OAQ to require the operation of CEMs on the galvanizing line. The Permittee in these comments has repeated the text and arguments of this letter. Therefore, the original text of the same has not been included in this addendum.

As this comment and the letter from Nucor's attorney dated November 6, 2001 pertain to the requirements for CEMs included in the permit, the response to these has been grouped with the other responses to similar concerns in the following pages.

The requirement to stack test to certify the CEMs is unchanged as IDEM, OAQ rejected the Permittee's argument about removing the CEMs.

Comment 5:

Section D.1.9(a)

Since the last draft, the OAQ added new Section D.1.9(a), which requires that Nucor determine optimum temperature of the SCR/SNCR units' catalyst bed during performance testing and thereafter start urea injection as soon as the catalyst bed reaches that temperature. OAQ cites the PSD regulations in support of this condition. Nucor has two major objections to this provision.

First, Nucor objects to this condition as being unnecessary and duplicative of other monitoring procedures. If OAQ accepts Nucor's proposed monitoring approach, detailed information showing that the NOx limit is met on a rolling seven day average will be available. If OAQ proceeded with its proposed CEMS requirement, to which Nucor objects as overkill for a small unit of this nature, twenty four-hour average NOx emissions data would be available. Either the Nucor proposal or the OAQ proposal provides better data of representative system performance than does a catalyst temperature monitoring requirement.

Second, the proposed condition does not fully reflect the complex operation of the galvanizing line. Line temperature depends upon the type of product that must be run. Different products require different temperatures for successful galvanizing, galvaluming, annealing or galvannealing. A simple, one-size fits all temperature is not necessarily achievable and may be undesirable by increasing total gas usage and/or causing product quality issues. While it is possible to develop a series of values for the various grades and types of product, the costs of testing and validation become prohibitive. So long as Nucor achieves its permit limits and the SCR/SNCR system is working properly, as demonstrated through stack testing and its proposed process control system NOx analyzer methodology, whether the catalyst temperature has achieved a certain temperature is largely irrelevant. The critical issue is whether Nucor is achieving its limits, not whether the technology is achieving maximum performance because the SCR/SNCR system is not subject to BACT or other technology-forcing standard.

In lieu of proposed D.1.9(a), Nucor proposes that IDEM, OAQ use the process control system NOx analyzer data. The control system NOx analyzer data provides better information on how the control system is performing because it measures the output (NOx) rather than a parameter (temperature). The process control system NOx analyzer thus gives Nucor greater flexibility to optimize operation of the galvanizing line while providing a stronger assurance of compliance. Accordingly, Nucor requests that IDEM, OAQ delete proposed condition D.1.9(a).

Response 5:

The permit condition D.1.1 (3), provides an exemption from operating the SCR/SNCR system, during the startup and shutdown duration of the galvanizing line operation. This exemption is included in the permit based on the fact that during these periods, the temperature of the exhaust gases may not be in the optimum range for the operation of SCR/SNCR system.

The NSR workshop manual by US EPA¹, stated that “Permit conditions defining excess emissions may include alternate conditions for startup, shutdown, and malfunctions such as maximum emission limits and operational practices and limits. These must be as specific as possible since such exemptions can be misused.”

Further in an EPA guidance memorandum², it states that, “Startup and shutdown of process equipment are part of the normal operation of a source and should be accounted for in the planning, design and implementation of operating procedures for the process and control equipment. Accordingly, it is reasonable to expect that careful and prudent planning and design will eliminate violations of emission limitations during such periods.”

Based on these and other similar guidance, it is pertinent for the IDEM, OAQ, to establish numerical emission limits and/or work practice standards, depending upon complexity of the operating scenarios for the galvanizing line. The IDEM, OAQ, recognizes the complex and multiple startup and operating scenarios for the galvanizing line. By this condition, the agency's intent is not to require the Permittee to establish multiple limits through multiple stack tests. Rather the Permittee, through a one time stack test, should be able to establish a baseline temperature for the exhaust stream at which the SCR control system is effective in controlling NOx emissions, to a level below the permit limit, with minimal ammonia slip. This temperature established during the test will set down the benchmark for the subsequent operation of the galvanizing line. Once the exhaust stream temperature reaches this temperature, the urea injection in the SCR should be started to control NOx emissions.

No changes are made to any permit conditions.

Comment 6:

Section D.1.10

As Nucor has previously commented, the CEMS requirement is arbitrary, capricious and unsupported by Indiana law and regulation and should be deleted in its entirety. Section D.1.10 incorrectly cites the language that “the owner of a new source with an emission limitation or permit requirement established under 326 IAC 2-5.1-3 and 326 IAC 2-2, shall be required to install a continuous emissions monitoring system or alternative monitoring plan as allowed under the Clean Air Act and 326 IAC 3-5-1(d)” as support for requiring a CEMS. While many monitoring requirements may be “allowed under” the Clean Air Act and 326 IAC 3-5-1(d), Indiana law and regulation does not require all new sources with an emission limitation or permit requirement under Indiana's construction of new sources and PSD permit review rules to install a CEMS. The cited references (i.e., 326 IAC 2-7-6(1) and 326 IAC 2-7-5(1)) do not authorize the imposition of a CEMS, but simply provide that a Part 70 permit contain monitoring requirements “sufficient to assure compliance” with permit terms and conditions. In order for IDEM, OAQ to justify requiring a CEMS, it must show that a CEMS is the only way of assuring compliance with permit terms and conditions. Please refer to the letter dated November 6, 2001 from Nucor's attorneys for further discussion of this issue.

IDEM cannot make such a showing. First, the galvanizing line as a whole is not a major source of NOx emissions. IDEM, OAQ has historically approved much larger sources of NOx without requiring a CEMS. Therefore, source size alone does not justify imposition of a CEMS.

¹ See Chapter H “Elements of an Effective Permit” in the, “New Source Review Workshop Manual”, by US EPA, Draft – October 1990

² See, Memorandum from John B. Rasnic, Director, Stationary Source Compliance Division, Office of Air Quality Planning and Standards, U.S. EPA, to Linda M. Murphy, Director, Air, Pesticides and Toxics Management Division, U.S. EPA Region I “Automatic or Blanket Exemptions for Excess Emissions During Startup, and Shutdowns Under PSD”-Jan. 28, 1993

Second, Nucor proposed to add a SCR/SNCR system to the Galvanizing Line as a non-BACT, supplemental environmental project in accordance with Section II.7 of Agreed Order 2000-8861-A. The basis for the SCR/SNCR system, Agreed Order 2000-8861-A, does not provide for a CEMS monitoring system. Hence, IDEM, OAQ cannot say that there is a Consent Order or negotiated basis for requiring a CEMS.

Third, the BACT determination for the galvanizing line is low NOx burners with a NOx emission rate of no more than 0.2 lbs NOx/mmbtu. No CEMS has been required for low NOx burners, so IDEM, OAQ cannot argue that BACT requires CEMS.

Fourth, to ensure compliance, Nucor has proposed to calculate a seven-day rolling NOx average based upon NOx analysis undertaken by the SCR/SNCR process control system. The system operates by measuring actual NOx concentrations in the ductwork and feeding this information into the SCR/SNCR control system to allow adjustment of treatment chemicals to ensure proper NOx control. Nucor will use this same information on a seven day rolling average basis, far less than the annual average NAAQS value or annual NOx limits in tons per year, to provide a reasonable assurance that the system is operating as designed and that it is achieving permitted emission rates. Indeed, Nucor's proposed monitoring goes far beyond historical IDEM compliance monitoring determinations for similar units, which typically have consisted of nothing more than vendor certification. Nucor's proposed seven day rolling NOx average is fully protective of the environment (the NAAQS for nitrogen dioxide is an annual average standard). It also provides an adequate assurance of compliance with the permit limit by allowing Nucor, and IDEM or any other reviewer, to determine at any time whether the galvanizing line is consistently meeting its permit limits. Furthermore, because the SCR/SNCR system is not a BACT requirement, but a voluntarily accepted limit more stringent than BACT, the increased stringency of the limit assures continuous compliance with the BACT limits (0.2 lbs NOx/mmbtu) and the rolling average monitoring assures compliance with the 2.8 and 2.9 lb NOx/hour permit limits. Accordingly, Nucor's proposed monitoring approach provides a good assurance of compliance both with BACT and with the more stringent limit Nucor voluntarily accepted.

Fifth, Nucor's proposed monitoring approach provides data that is substantially equivalent to a CEMS with little additional cost. Simply installing a CEMS, on the other hand, would cost up to \$152,600.00 in initial costs according to a recent estimate provided by TESS-COM, Inc., with additional operational, instrument maintenance, repair, training, and testing costs. Because there is little or no gain in environmental compliance gained by imposing a CEMS over what is obtained from Nucor's approach, it is not worth the cost to add an additional CEMS for no environmental gain. In fact, requiring a CEMS in such a situation is a waste of resources that could be better spent on other air pollution control and hence is arbitrary and capricious. Accordingly, requiring a CEMS in light of Nucor's proposal is unwarranted and therefore Section D.1.9 should be deleted.

As a more appropriate alternative, Nucor recommends the following monitoring requirement language:

For NOx, the Permittee shall monitor the SCR/SNCR system process controls on the Preheat and Radiant Tube sections.

- (1) The SCR/SNCR process control system shall be set to calculate, sum and record on an alternating basis the Preheat and the Radiant Tube sections NOx hourly emissions rates in pounds per hour as a rolling seven day average.
- (2) The Permittee shall record the rolling seven-day average and maintain these records for five years. The Permittee shall keep records of the algorithm used to convert values from the process control system analyzer ppm values to the rolling seven-day average available for inspection.

- (3) The Permittee shall calibrate the SCR/SNCR system process control system in accordance with manufacturer's specifications. The Permittee shall keep records of these calibrations.
- (4) The source may submit to the OAQ alternative emission factors based on the process control system data to use in lieu of the vendor provided emission factors in instances of process control system analyzer downtime. The alternative emissions factors may be used, after OAQ approval, for calculating emissions during a period of downtime.

Response 6:

The rule referred in the permit 326 IAC 3-5-1 (d) authorizes the IDEM, OAQ to require the emissions monitoring from a source to ensure compliance with the emissions limits established in the permits issued pursuant to 326 IAC 2-2 (Prevention of Significant Deterioration). In addition under the same rule, the IDEM, OAQ is authorized to require emissions monitoring to ensure compliance with the permit requirement. Therefore, pursuant to this provision, the department has full authority to impose conditions requiring emissions monitoring systems for the galvanizing line operation.

The IDEM, OAQ firmly believes that use of NO_x CEMs to demonstrate compliance, with the NO_x limit in the permit as BACT, using the SCR system, as a control is appropriate. This position is substantiated further in the following discussion.

1. As explained in the TSD on page 2 of 10, the permit to modify the galvanizing line for addition of radiant tube burner (CP 107-3702-00038) was issued on March 28, 1995. This modification was carried out along with other significant changes at the plant. This was a major modification under PSD and was reviewed such. The Permittee violated the permit requirements by not complying with the permit limits in CP 107-3702-00038 for NO_x emissions. Therefore, the modification to revise the NO_x limit was subject to PSD review and BACT limitations.

In addition the uncontrolled potential to emit of NO_x from the galvanizing line is 83.9 tons per year which is greater than 40 tons per year, the significance level for NO_x emissions. Therefore, the modification is subject to the PSD review.

2. The Permittee's contention that the SCR/SNCR system is the supplemental environmental project, non-BACT measure of control is inaccurate. As stated in the TSD, whereas, the requirement to add SCR/SNCR system to the preheat section of the galvanizing line was part of the supplemental environmental project, pursuant to the agreed order 2000-8861-A, this is not true for the radiant tube section. The BACT for the NO_x emissions from the radiant tube section burners is low-NO_x burners with emission rate of 200 lb/MMSCF of natural gas burned. The Permittee had stated that in place of retrofitting the existing radiant tube burners, with low-NO_x radiant tube burners, they would install a SCR system to control NO_x emissions. Therefore, the requirement to operate the SCR is not entirely part of the supplemental environmental project but is also the BACT for the radiant tube section burners.
3. The IDEM, OAQ does not require the installation of NO_x CEMs on the low-NO_x burner emission units, unless it has reason to believe that there is a possibility of exceedence of the guaranteed emission rate. In this case the Permittee uses a SCR system, as an add-on control to limit NO_x emissions to below BACT level, and does not have low-NO_x burners. The IDEM, OAQ never stated that BACT requires CEMs. Rather its argument is that operation of SCR as control requires use of CEMs to show compliance. This is further discussed below:

In a guidance memo¹ on this subject US EPA has stated that, “When permits require add-on controls operated at a specified efficiency level, permit writers should include, so that the operating efficiency condition is enforceable as a practical matter, those operating parameters and assumptions which the permitting agency depended upon to determine that the control equipment would have a given efficiency.”

The same memo further states that “The particular circumstances of some individual sources make it difficult to state operating parameters for control equipment limits in a manner that is easily enforceable as a practical matter. Therefore, there are two exceptions to the absolute prohibition on using blanket emission limits to restrict potential to emit. If the permitting agency determines that setting operating parameters for control equipment is infeasible in a particular situation, a federally enforceable permit containing short term emission limits (e.g. lbs per hour) would be sufficient to limit potential to emit, provided that such limits reflect the operation of the control equipment, and the permit includes requirements to install, maintain, and operate a continuous emission monitoring (CEM) system and to retain CEM data, and specifies that CEM data may be used to determine compliance with the emission limit.”

The NSR workshop manual by US EPA², stated in table H.1 that Emission Compliance Demonstration can be performed by initial performance test method and continuous emission monitoring method. Further on page c.4 in Appendix C of the same manual it is stated that “Emissions limits should reflect operation of the control equipment, be short term, and, where feasible, the permit should require a continuous emissions monitor.”

The operational parameters (such as catalyst temperature, urea feed rate) for a SCR system are not reliable surrogate for the NOx emission rate. Therefore, as stated above, the OAQ, IDEM has set a short-term emission limit for NOx emissions from the radiant tube section and required the installation of NOx CEMs to show compliance.

4. The IDEM, OAQ rejected the Nucor's suggestion that the averaging period for the NOx emissions from the galvanizing line should be changed from 24 operating hour block average to a seven day rolling average. This is because, the IDEM, OAQ feels that the NOx averaging period of 24 hour is protective of the environment and human health and is consistent with US EPA policy to set short averaging periods to achieve the maximum degree of reduction required by the BACT and to show compliance with applicable limits. The 24 operating hour block averaging period was chosen because it provides the Permittee with the long enough opportunity to control emissions to average out any NOx emissions fluctuations, observed during product changes or flow rate variations. Although the NAAQS for NOx is an annual average standard, the air quality planning for ozone uses daily or seasonal emission rates. In addition, in recent determinations, the IDEM, OAQ has required an averaging period as low as 3 hour for the NOx emissions. The Permittee is allowed a 24 hour average period keeping in mind the fluctuations caused by intermittent nature of operation. Therefore, the averaging period is unchanged at 24 hours for the NOx emissions.
5. The Permittee's suggestion to use process control monitor as an alternative to the CEMs at this facility is unacceptable to IDEM, OAQ. The process control system measures NOx emission rate at the outlet of the SCR/SNCR system and feedback this information to

¹ See, Memorandum from Terrell E. Hunt, Associate Enforcement Counsel, Air Enforcement Division, Office of Enforcement and Compliance Monitoring, and Stationary Source Compliance Division Office Of Air Quality Planning And Standards, US EPA in “Limiting Potential To Emit In New Source Permitting” – June 13, 1989

² See Chapter H page H.4 table H.1, “Elements of an Effective Permit” in the, “New Source Review Workshop Manual”, by US EPA, Draft – October 1990

control urea flow in the inlet. This process control monitor does not meet the quality control/quality assurance standards and is not certified and calibrated per IDEM, OAQ guidance. Therefore, the NOx emission rate data collected by this monitor is not completely reliable and does not assure compliance with the permit limit. The requirement to install CEMs provides reasonable assurance that the NOx emissions data is reliable and acceptable to show compliance status of the emissions unit. The process monitor will not be accepted as substitute for CEMs for this permit.

Comment 7:

Section D.1.12

In light of the Nucor's comments on the CEMS requirement, Nucor requests that the references to "continuous emissions monitoring system" and "CEMS" be replaced with "process control system."

Response 7:

This comment is not relevant as the IDEM, OAQ has rejected the request to replace process control system as an alternative to CEMs at this source.

Comment 8:

II. Technical Support Document (TSD)

History

Time line for submission of modifications:

For purposes of clarification, replace "unpermitted burners in radiant tube section and nonconforming burners in the preheat section" with "unpermitted burners in the preheat section and non-conforming burners in the radiant tube section" in paragraph (1).

Response 8:

The IDEM, OAQ, acknowledges this change in this addendum to the TSD. The TSD for the draft permit is not modified as it reflects the background information for the draft permit. All changes in the TSD are documented in the addendum to the TSD.

Comment 9:

Potential to Emit of the Modification

The table incorrectly reflects potential to emit as uncontrolled emissions by not including federally enforceable controls. In this case, the 16 original preheat burners, the 3 auxiliary burners and the 24 original radiant tube burners all have applicable federally enforceable limits.

Response 9:

As stated on the page 4 of the TSD, the controls are not enforceable until required in a federally enforceable permit. The SCR is not required in a permit as yet. After the issuance of this permit the controls will be enforced. This is not to be confused with the requirement to install and operate the controls per the Agreed Order A 2000-8861-A. The table reflects potential to emit before controls from the galvanizing line. No changes are made to the permit.

Comment 10:

State Rule Applicability

As stated above, 326 IAC 3-5 (Continuous Monitoring of Emissions) does not require the imposition of a CEMS. Pursuant to 326 IAC 3-5-1(a), the Continuous Monitoring of Emissions rule establishes: (1) CEMS requirements for certain types of sources; and (2) a process for developing suitable monitoring requirements for other types of sources. CEMS are only required for the enumerated list of “affected facilities” as described in 326 IAC 3-5-1(b). Nucor Steel is not on that list. As a result, the CEMS requirements set forth in 326 IAC 3-5-1(c) do not apply to Nucor.

As for the process for developing suitable monitoring requirements for other types of sources, 326 IAC 3-5-1(d) provides:

The department may require, as a condition of a construction or operating permit issued under 326 IAC 2-1, 326 IAC 2-2, 326 IAC 2-3, 326 IAC 2-7, 326 IAC 2-8, or 326 IAC 2-9 that the owner or operator of a new or existing source of air emissions monitor emissions to ensure compliance with the following:

- (1) An emission limitation or standard established in one (1) of the permits listed in subsection (d) [this subsection].
- (2) Permit requirements.
- (3) Monitoring requirements in 326 IAC 7.

Accordingly, the OAQ has the authority to require, as a condition of a construction permit issued under 326 IAC 2-2, that Nucor monitor emissions “to ensure compliance” with the permit requirements.

Again, simply because a certain requirement may be “allowed under” the Clean Air Act or 326 IAC 3-5 does not mean that it is required. Indeed, 326 IAC 3-5-1(e)(2) clarifies that the department is allowed to impose more restrictive requirements than that set forth in the rule ***if those more restrictive requirements were required under any other provision*** of the CAA, including Section 114(a)(1), or state statutes or regulations, as applicable. However, there is no other rule or requirement that supports the imposition of a CEMS. As a result, IDEM may only require sufficient monitoring to ensure compliance. As discussed previously, Nucor has proposed sufficient monitoring to provide IDEM with a reasonable assurance of compliance and therefore the 326 IAC 3-5 (Continuous Monitoring of Emissions) discussion should be deleted.

Compliance Requirements

For the reasons stated previously, the discussion regarding continuous emissions monitoring system should be replaced with Nucor’s “process control system.”

Response 10:

This comment is not relevant as the IDEM, OAQ has rejected the request to replace process control system as an alternative to CEMs at this source. The IDEM, OAQ authority and basis for requiring CEMs to monitor NOx emissions from the galvanizing line have been discussed in detail in earlier response. No changes are made.

Comment 11:

III. Air Quality Analysis

On page 1, line 1 of the Air Quality Analysis, IDEM, OAQ states that this permit is to modify

Nucor's "gas combustion and strip caster equipment." This permit application does not address the strip caster equipment in any way. Nucor requests that this phrase be deleted from the Air Quality Analysis.

Similarly, on page 1, line 1 of "Summary", IDEM, OAQ repeats that the permit is to modify Nucor's "gas combustion and strip caster equipment." This permit application does not address the strip caster equipment in any way. Nucor requests that this phrase be deleted from the Air Quality Analysis.

Response 11:

The OAQ, IDEM acknowledges these changes in this addendum to the TSD. No changes are made to the modeling TSD for the draft permit.

Comment 12:

On April 11, 2002, Nucor submitted additional information with respect to the change in operation at the galvanizing line. The Nucor Steel is requesting the addition of the following maintenance operation change to the permit. Nucor uses wringer rolls to remove excess water from the steel strip as it passes through the Quench Tank in the galvanizing line. As these rolls deteriorate, they cause poor quality of steel produced. Due to the location and mounting of these rolls it is time consuming, labor intensive operation to change out these rolls involving safety issues. Nucor has to slow the line production and carryout maintenance works to replace the rollers. Nucor's present proposal will allow the rolls to be pre-assembled in a cartridge. These roll containing cartridges can be exchanged while the galvanizing line process continues to operate. A compressed air knife will be engaged to remove water from the steel strip during the short time the roll cartridges are being exchanged. This change will allow the galvanizing line to continue operations during the roll change, decrease the time it takes to change the rolls and reduces the safety risks involved.

Response 12:

The IDEM, OAQ examined this change and has documented the impacts of this change as follows:

1. The burner capacities (the only source of emissions) on the galvanizing line are not affected.
2. The instantaneous processing capacity (steel throughput rate) at the galvanizing line in terms of tons of steel per hour remains unaffected.
3. There is no change in the actual emissions, other than the small reduction in the downtime of the galvanizing line, by cutting down the need for maintenance work.
4. The emissions at the 8760 hours per year (the maximum possible hours in a year) of operation of the galvanizing line have been reviewed in 2001 and 2002 under this PSD permit. Therefore, reduced downtime does not effect the potential to emit of various pollutants.
5. This PSD permit establishes the following requirements for the galvanizing line, at the 8760 hours of operation per year:
 - (a) Control technology review: requirements (BACT)
 - (b) Air quality analysis: requirements
 - (c) Air quality impact: requirements
 - (d) Increment consumption: requirements
 - (e) Additional analysis: requirements

The results of detailed review of these requirements have been documented in the Technical

Support Document for this permit. None of these requirements are affected by the change to pre-assembled rolls.

6. The proposed change (cartridge containing wringer rolls) at the galvanizing line will not change the critical operational parameters. In fact the PSD permit aspects listed in item 4 above will remain unchanged even if the proposed change is considered as a separate modification.
7. The IDEM, OAQ recognizes that the primary reason to implement the proposed change is to improve the employee safety where the maintenance workers will not be subject to risk of being exposed to high temperature. This improvement, being important is not the overbearing factor in this analysis.
8. Therefore, the IDEM, OAQ in this addendum to the TSD for the PSD permit 107-14297-00038, states that the Nucor's proposed change does not effect the equipment operation, and the proposed permit. Therefore, any change in the net emissions due to the proposed change does not have to be reviewed towards applicability of PSD review.

The IDEM, OAQ has revised the condition B.4 of this Significant Source Modification to further clarify the procedure for future modifications to this equipment as follows:

B.4 Significant Source Modification [326 IAC 2-7-10.5(h)]

This document shall also become the approval to operate pursuant to 326 IAC 2-7-10.5(h) when, prior to start of operation, the following requirements are met:

- (a) The attached affidavit of construction shall be submitted to the Office of Air Quality (OAQ), Permit Administration & Development Section, verifying that the emission units were constructed as proposed in the application or the permit. The emissions units covered in the Significant Source Modification approval may begin operating on the date the affidavit of construction is postmarked or hand delivered to IDEM if constructed as proposed.
- (b) If actual construction of the emissions units differs from the construction proposed in the application or the permit **in a manner that is regulated under the provisions of 326 IAC 2-2**, the source may not begin operation until the source modification has been revised pursuant to **the provisions of that rule and the provisions of 326 IAC 2-1.1-6** and an Operation Permit Validation Letter is issued.
- (c) **If actual construction of the emissions units differs from the construction proposed in the application or the permit in a manner that is not regulated under the provisions of 326 IAC 2-2, the source may not begin operation until the source modification has been revised pursuant to the provisions of that rule and the provisions of 326 IAC 2-7-11 or 326 IAC 2-7-12 and an Operation Permit Validation Letter is issued.**
- (ed) The Permittee shall receive an Operation Permit Validation Letter from the Chief of the Permit Administration & Development Section and attach it to this document.
- (de) The changes covered by the Significant Source Modification will be included in the Title V draft.

Indiana Department of Environmental Management Office of Air Quality

Technical Support Document (TSD) for a Part 70 Significant Source Modification requiring PSD Review

Source Background and Description

Source Name:	Nucor Steel
Source Location:	Route 2, Box 311, Crawfordsville, Indiana 47933
County:	Montgomery
SIC Code:	3312
Operation Permit No.:	107-7172-00038
Operation Permit Issuance Date:	Not Yet Issued
Significant Source Modification No.:	107-14297-00038
Permit Reviewers:	Gurinder Saini

The Office of Air Quality (OAQ) has reviewed a modification application from Nucor Steel relating to the construction of the following emission units and pollution control devices:

1. Thirty six (36) Main Burners, each at 1.622 MMBtu/hour and three (3) Auxiliary Burners, each at 0.1 MMBtu/hour in the preheat furnace section of the galvanizing line using natural gas rated at maximum total capacity of 58.7 MMBtu per hour. The NO_x emissions are controlled by a Selective Catalytic Reduction / Selective Non-Catalytic Reduction (SCR/SNCR) Systems.
2. Forty four (44) Burners, each at 0.323 MMBtu/hour in radiant tube section with a maximum total capacity of 14.2 MMBtu per hour and option to replace non-conforming burners. The NO_x emissions are controlled by SCR/SNCR Systems.
3. Add a new galvalum tank to the galvanizing line.
4. Modify galvanizing line to bypass zinc pot to produce annealed steel, phosphate or chromate application in addition to producing galvanized steel.
5. Further Nucor has provided details of small emission units at galvanizing line as follows:
 - (a) One (1) auxiliary burner with maximum heat input rate of 3.2 MMBtu per hour in the Alkaline Cleaning Section.
 - (b) Two (2) auxiliary burners with maximum heat input rate of 1.5 MMBtu per hour each in the Strip Dryer Section.
 - (c) Four (4) auxiliary burners with maximum heat input rate of 0.058 MMBtu per hour each in the Pot Roll Heater.
 - (d) Two (2) emergency burners with maximum heat input rate of 0.52 MMBtu per hour each in the Zinc Pot Section.
 - (e) Two (2) auxiliary burners with maximum heat input rate of 0.013 MMBtu per hour each in the Preheat open end burners section.
 - (f) One (1) Mist Eliminator with maximum capacity of 5000 acfm in the Alkaline Cleaning Section.
6. The burners specified above use natural gas as primary fuel and propane as backup fuel.

History

On February 21, 2000, Nucor Steel submitted an application to the OAQ requesting to change burner configuration and add new burners and SCR system at the existing Galvanizing line in their

existing plant. Nucor Steel has applied for a Part 70 permit on November 14, 1996.

The following is brief history of permitting for the Galvanizing line:

1. Registration CP 107-2164-00038 issued on February 7, 1992 for 36 MMBtu/hour furnace with low NOx burners and hot dip galvanized coating line using electric Zinc melting pot. Combustion gases exhaust through a stack 10 feet above the cold mill building.
2. Construction Permit (with PSD review) CP 107-2764-00038 issued on November 30, 1993 for increase in steel production at the Nucor plant.

Applicable condition:

20. That the Zinc Coating Line and Furnace (CP 107-2164) shall be limited as follows:
 - a. This process is capable of applying 2,045 pounds of zinc coating per hour and is equipped with an electric zinc melting container.
 - b. The preheat and radiant heat sections are limited solely to the use of natural gas and limited to 26 and 10 million BTU per hour heat input respectively.
 - c. Particulate matter/PM-10 emissions:
 - (1.) The preheat and radiant heat sections shall be limited to 3.0 pounds per million cubic feet of natural gas burned, 0.1 pounds per hour, and 0.5 tons per year.
 - (2.) The zinc coating line shall be limited to 3.5 pounds per ton of zinc coating applied, 3.6 pounds per hour, and 15.67 tons per year.
 - d. Nitrogen Oxide(s) emissions shall be limited to 140 pounds per million cubic feet of natural gas burned, 4.2 pounds per hour and 18.2 tons per year (control device efficiency of 82.4 percent).
 - e. Carbon Monoxide emissions shall be limited to 35.0 pounds per million cubic feet of natural gas burned, 1.3 pounds per hour, and 5.5 tons per year.
 - f. Volatile organic compound emissions shall be limited to 2.8 pounds per million cubic feet of natural gas burned, 0.1 pounds per hour, and 0.4 tons per year.
3. Construction Permit (with PSD review) CP 107-3702-00038 issued on March 28, 1995 for addition of 10 MMBtu/hour low NOx burners to the galvanizing line exhausting through the roof vents 70 feet above the ground.

Applicable condition:

11. That the addition of 10 MMBtu heat input to radiant section of the galvanizing line shall be low NOx natural gas fired burners designed to emit no more than 90 lbs of NOx per million cubic feet of gas burned.

The following were the non-compliant or unpermitted units at the Galvanizing line:

1. In April 1995, Nucor installed twenty (20) 0.281 MMBtu/hour gas fired burners which have NOx emission rate of 415 lb per million cubic feet of gas burnt. These were installed in radiant tube section of the galvanizing line.
2. In April 1995, Nucor installed twenty (20) 1.41 MMBtu/hour gas fired burners to the preheat section of galvanizing line without obtaining permit.
3. In May 1995, Nucor began operating the twenty (20) 1.41 MMBtu/hour gas fire burners in the preheat section of the galvanizing line.

On January 31, 2000, the IDEM and Nucor signed an Agreed Order No.2000-8861-A to settle these actions, submit a permit application to obtain a valid permit for these burners and install Selective Catalytic Reduction (SCR) systems on the radiant tube section and preheat furnace section of the galvanizing line.

Time line for submission of modifications:

1. On February 21, 2000, Nucor submitted the application (under this review) for permit as required by the above mentioned agreed order for the unpermitted burners in the radiant tube section and nonconforming burners in the preheat furnace section of the galvanizing line as per the requirements of 326 IAC 2-2 Prevention of Significant Deterioration (PSD).

This modification was required to be reviewed under PSD because the original construction permit CP 107-3702-00038 was a PSD modification, and these burners are considered part of this initial PSD modification.

2. On May 11, 2000, Nucor submitted the Addendum 1 to this application stating that it will install separate SCR systems for radiant tube heat section and preheat furnace of the galvanizing line. The exhaust from the two SCR's will be combined and exit through single stack.
3. On July 10, 2000, Nucor submitted Addendum 2 to this application requesting modification to the heat input capacity for the burners. Nucor Steel has stated that vendor specification allows them to operate these burners at 15% higher capacity and therefore should be permitted at that level. This will result in heat input capacity changes as follows:

Radiant Tube Heat Section Burners:

Previously - 44 burners rated at 0.281 MMBtu per hour
New - 44 burners rated at 0.323 MMBtu per hour

Preheat Furnace Section Burners:

Previously - 44 burners rated at 1.41 MMBtu per hour
New - 44 burners rated at 1.622 MMBtu per hour

4. On May 17, 2001, Nucor submitted Addendum 3 to this application requesting the same modification as previously stated in Addendum 2. In addition Nucor stated that vendor had requested for additional safety factor (25%) of uncontrolled NOx emissions for the preheat and radiant heat section burners.

Permit Conditions Superseded

This permit supersedes conditions related to operation of Galvanizing line in the following permits:

1. Registration CP 107-2164-00038 issued on February 7, 1992
2. Construction Permit CP 107-2764-00038 issued on November 30, 1993
3. Construction Permit CP 107-3702-00038 issued on March 28, 1995

Stack Summary

Stack ID	Height (feet)	Diameter (feet)	Flow Rate (acfm)	Temperature (°F)
Preheat Furnace Radiant Section	80	7	83,840	800

Recommendation

The staff recommends to the Commissioner that the Part 70 Significant Source Modification be approved. This recommendation is based on information derived from applications submitted by the applicant on February 21, 2001 (application 107-11908-00038) and April 23, 2001 (application 107-14297-00038). IDEM, OAQ had determined that equipment covered in these two applications was related. As a result, the applications were combined for under single review.

Emission Calculations

The emission calculations for the criteria pollutants are provided in Appendix A.

Emission estimate for Alkali Cleaning section mist eliminator:

PM/PM10 emission rate = 0.003 grains/dscf

$$\text{PM/PM10 emissions} = \frac{0.003 \text{ grains} \times 1 \text{ lb}}{\text{Dscf} \quad 7000 \text{ grain}} \times \frac{5000 \text{ ft}^3}{\text{minute}} \times \frac{60 \text{ minute}}{\text{hour}}$$

$$= 0.13 \text{ lb/hour} \times 8760 \text{ hours/year} \times 1 \text{ ton/2000 lb}$$

$$= 0.6 \text{ tons/year}$$

Potential To Emit of the Modification

Pursuant to 326 IAC 2-1.1-1(16), Potential to Emit is defined as “the maximum capacity of a stationary source to emit any air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of a source to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or type or amount of material combusted, stored, or processed shall be treated as part of its design if the limitation is enforceable by the U. S. EPA.”

This table reflects the PTE before controls from all the emission units listed on page 1 of this TSD. Control equipment is not considered federally enforceable until it has been required in a federally enforceable permit.

Pollutant	Potential To Emit (tons/year)
PM	1.3
PM-10	3.3
SO ₂	0.2
VOC	1.9
CO	29.6
NO _x	83.9

Justification for Modification

The Part 70 Operating permit is being modified through a Part 70 Significant Source Modification. This modification is being performed pursuant to 326 IAC 2-7-10.5 (f)(1), because this is a significant modification under 326 IAC 2-2 (Prevention of Significant Deterioration).

County Attainment Status

The source is located in Montgomery County.

Pollutant	Status
PM-10	Attainment
SO ₂	Attainment
NO ₂	Attainment
Ozone	Attainment
CO	Attainment
Lead	Attainment

- (a) Volatile organic compounds (VOC) and oxides of nitrogen (NO_x) are precursors for the formation of ozone. Therefore, VOC and NO_x emissions are considered when evaluating the rule applicability relating to the ozone standards. Montgomery County has been designated as attainment or unclassifiable for ozone. Therefore, VOC and NO_x emissions were reviewed pursuant to the requirements for Prevention of Significant Deterioration (PSD), 326 IAC 2-2 and 40 CFR 52.21.
- (b) Montgomery County has been classified as attainment or unclassifiable for all criteria pollutant. Therefore, these emissions were reviewed pursuant to the requirements for Prevention of Significant Deterioration (PSD), 326 IAC 2-2 and 40 CFR 52.21.

Source Status

Existing Source PSD Definition (emissions after controls, based upon 8760 hours of operation per year at rated capacity and/or as otherwise limited):

Pollutant	Emissions (tons/year)
PM	>100
PM-10	>100
SO ₂	>100
VOC	>100
CO	>100
NO _x	>100

- (a) This existing source is a major stationary source for PSD because an attainment regulated pollutant is emitted at a rate of 100 tons per year or more, and it is one of the 28 listed source categories.

Proposed Modification

PTE from the proposed modification (based on 8,760 hours of operation per year at rated capacity including enforceable emission control and production limit, where applicable):

Pollutant	PM (ton/yr)	PM10 (ton/yr)	SO ₂ (ton/yr)	VOC (ton/yr)	CO (ton/yr)	NO _x (ton/yr)
Proposed Modification	1.3	3.3	0.2	1.9	29.6	26
Net Emissions	1.3	3.3	0.2	1.9	29.6	26
PSD Significant Level	25	15	40	40	100	40

- (a) This modification is major, because it was permitted and carried out along with the construction of pickle line as permitted in CP 107-3702-00038. As CP107-3702-00038 had controlled PTE for PM, PM10, and NO_x above PSD significant levels. Therefore, pursuant to 326 IAC 2-2, and 40 CFR 52.21, the PSD requirements apply to these pollutants.
- (b) The NO_x emissions from this modification are controlled by Selective Catalytic Reduction systems (SCR) / Selective Non-Catalytic Reduction (SNCR).

Part 70 Permit Determination

326 IAC 2-7 (Part 70 Permit Program)

This existing source has submitted their Part 70 (T 107-7172-00038) application on November 14, 1996. The equipment being reviewed under this permit shall be incorporated in the submitted Part 70 application.

Federal Rule Applicability

- (a) There are no New Source Performance Standards (NSPS)(326 IAC 12 and 40 CFR Part 60) applicable to this proposed modification.
- (b) There are no National Emission Standards for Hazardous Air Pollutants (NESHAPs)(326 IAC 14 and 40 CFR Part 63) applicable to this proposed modification.

State Rule Applicability - Individual Facilities

326 IAC 1-6-3 (Preventive Maintenance):

- (a) The Permittee shall prepare and maintain Preventive Maintenance Plans (PMP) after commencement of operation, including the following information on each:
 - (1) Identification of the individual(s) responsible for inspecting, maintaining, and repairing control devices;
 - (2) A description of the items or conditions that will be inspected and the inspection schedule for said items or conditions;
 - (3) Identification and quantification of the replacement parts that will be maintained in inventory for quick replacement.

The OAQ, IDEM has evaluated that for the galvanizing line, the PMP is required for the control device only.
- (b) The Permittee shall implement the Preventive Maintenance Plans as necessary to ensure that lack of proper maintenance does not cause or contribute to a violation of any limitation on emissions or potential to emit.

- (c) PMP's shall be submitted to IDEM and OAQ upon request and shall be subject to review and approval by IDEM and OAQ.

326 IAC 1-7 (Stack Height Provisions):

Stack for Galvanizing line is not subject to the requirements of 326 IAC 1-7 (Stack Height Provisions) because the potential emissions, which exhaust through the above-mentioned stack, are less than 25 tons per year of PM and SO₂.

326 IAC 2-4.1-1 (HAPs Major Source: New Source Toxics Rule)

The New Source Toxics Control rule requires any new or reconstructed major source of hazardous air pollutants (HAPs) for which there are no applicable NESHAP to implement maximum achievable control technology (MACT), determined on a case-by-case basis, when the potential to emit is greater than 10 tons per year of any single HAP. Information on emissions of the 187 hazardous air pollutants are listed in the OAQ Construction Permit Application, Form Y (set forth in the Clean Air Act Amendments of 1990). These pollutants are either carcinogenic or otherwise considered toxic and are commonly used by industry.

The HAPs emissions from the addition of burners to galvline are added to the HAPs emissions from the emission units listed in CP 107-3702-00038. As the burners were part of same modification, combined HAPs emissions will be considered for the applicability of this rule.

The New Source Toxic Rule is not applicable because any single HAP emission is not greater than or equal to 10 tons per year and any combination HAP emissions are not greater than or equal to 25 tons per year.

326 IAC 2-2-3 (Best Available Control Technology)

As the burners in the preheat section and radiant tube section of the Galvanizing line are part of the PSD project, these are subject to the requirements of 326 IAC 2-2 (Prevention of Significant Deterioration) for emissions of PM, PM₁₀, and NO_x are required to employ BACT to control emissions.

Therefore, the PSD provisions require that this modification be reviewed to ensure compliance with the National Ambient Air Quality Standard (NAAQS), the applicable PSD air quality increments, and the requirements to apply the Best Available Control Technology (BACT) for the affected pollutants.

The attached modeling analysis, included in Appendix B, was conducted to show that the major new source does not violate the NAAQS and does not exceed the incremental consumption above eighty percent (80%) of the PSD increment for any affected pollutant.

The BACT Analysis Report, included in Appendix C, was conducted for the PSD pollutants for each process on a case-by-case basis by reviewing similar process controls and new available technologies. The BACT determination is based on the cost per ton of pollutant removed, energy requirements, and environmental impacts. The following BACT emission limitations apply to the galvanizing line.

NO_x Emissions

1. The 36 Main Burners, each at 1.622 MMBtu/hour and 3 Auxiliary Burners, each at 0.1 MMBtu/hour in the Preheat section of Galvanizing line shall meet a NO_x emissions limit of 2.9 pounds per hour using Low NO_x burners and SCR/SNCR. This limit is derived from NO_x emission rate of fifty (50) pounds per million standard cubic feet of natural gas usage as determined to be BACT (the BACT level of NO_x emission rate is 200 lb/MMBtu) and use of SCR/SNCR as specified in the conditions in the Agreed Order. Pursuant to Agreed Order 2000-8861-A, dated February 2, 2000 and subsequent amendment dated June 16, 2000, the Permittee shall install a SCR/SNCR System on the Preheat section to control

NOx emissions as part of Supplemental Environmental Project. The Permittee shall operate the SCR/SNCR system to achieve at least 75% control of NOx emissions whenever these burners are in operation except during startup and shutdown.

2. The 44 Burners, each at 0.323 MMBtu/hour in the Radiant tube section of Galvanizing line shall meet a NOx emissions limit of 2.8 pounds per hour by using Low NOx burners or SCR/SNCR system. This limit is derived from NOx emission limit of two hundred (200) pounds per million standard cubic feet of natural gas usage as determined to be BACT. The permittee has proposed to install the SCR/SNCR system to control NOx emissions from the Radiant tube section to meet this limit. The Permittee shall operate the SCR/SNCR system to achieve at least 75% control of NOx emissions whenever these burners are in operation except during startup and shutdown.
3. During the Startup and Shutdown period, the temperature of the exhaust gases does not fall in the optimum temperature range for the operation of SCR/SNCR. Therefore, the SCR/SNCR operations are exempt from complying with the BACT and Agreed Order limits for this duration. The Permittee shall not produce more than incidental product during the Startup and Shutdown period from the Galvanizing line.

PM and PM10 Emissions

1. The 36 Main Burners, each at 1.622 MMBtu/hour and 3 Auxiliary Burners, each at 0.1 MMBtu/hour in the Preheat section of Galvanizing line shall meet a PM and PM10 emissions limit of 1.9 and 7.6 pounds per million standard cubic feet of natural gas usage using good combustion practices.
2. The 44 Burners, each at 0.323 MMBtu/hour in the Radiant tube section of Galvanizing line shall meet a PM and PM10 emissions limit of 1.9 and 7.6 pounds per million standard cubic feet of natural gas usage using good combustion practices.

CO Emissions

1. The 36 Main Burners, each at 1.622 MMBtu/hour and 3 Auxiliary Burners, each at 0.1 MMBtu/hour in the Preheat section of Galvanizing line shall meet a CO emissions limit of 84.0 pounds per million standard cubic feet of natural gas usage using good combustion practices.
2. The 44 Burners, each at 0.323 MMBtu/hour in the Radiant tube section of Galvanizing line shall meet a CO emissions limit of 84.0 pounds per million standard cubic feet of natural gas usage using Low NOx burners using good combustion practices.

VOC Emissions

1. The 36 Main Burners, each at 1.622 MMBtu/hour and 3 Auxiliary Burners, each at 0.1 MMBtu/hour in the Preheat section of Galvanizing line shall meet a VOC emissions limit of 5.5 pounds per million standard cubic feet of natural gas usage using good combustion practices.
2. The 44 Burners, each at 0.323 MMBtu/hour in the Radiant tube section of Galvanizing line shall meet a VOC emissions limit of 5.5 pounds per million standard cubic feet of natural gas usage using Low NOx burners using good combustion practices.

326 IAC 3-5 (Continuous Monitoring of Emissions)

- (a) Pursuant to 326 IAC 3-5-1(d)(1), the owner or operator of a new source with an emission limitation or permit requirement established under 326 IAC 2-5.1-3 and 326 IAC 2-2 shall be required to install a continuous emissions monitoring system or alternative monitoring

plan as allowed under the Clean Air Act and 326 IAC 3-5.

- (b) For NO_x, the Permittee shall install, calibrate, certify, operate and maintain a continuous emissions monitoring system for stack in accordance with 326 IAC 3-5-2 and 3-5-3.
 - (1) The continuous emissions monitoring system (CEMS) shall measure NO_x emissions rate in pounds per hour. The use of CEMS to measure and record the NO_x hourly emission rates over a twenty-four (24) operating hour averaging period is sufficient to demonstrate compliance with the limits established in the BACT analyses. The source shall maintain records of emission rates in pounds per hour.
 - (2) The Permittee shall submit to IDEM, OAQ, within ninety (90) days after monitor installation, a complete written continuous monitoring standard operating procedure (SOP), in accordance with the requirements of 326 IAC 3-5-4.
 - (3) The Permittee shall record the output of the system and shall perform the required record keeping, pursuant to 326 IAC 3-5-6, and reporting, pursuant to 326 IAC 3-5-7.
 - (4) The source may submit to the OAQ alternative emission factors based on the source's CEMS data (collected over one (1) season of operation; where a season is defined as the period of time from May 1 through September 30) and the corresponding site temperatures, to use in lieu of the vendor provided emission factors in instances of downtime. The alternative emissions factors must be approved by the OAQ prior to use in calculating emissions for the limitations established in this permit. The alternative emission factors shall be based upon collected monitoring and test data supplied from an approved continuous emissions monitoring system. In the event that the information submitted does not contain sufficient data to establish appropriate emission factors, the source shall continue to collect data until appropriate emission factors can be established.

Compliance with this condition shall determine continuous compliance with the NO_x emission limits established under the preliminary PSD BACT (326 IAC 2-2).

326 IAC 5-1 (Opacity Limitations)

Pursuant to 326 IAC 5-1-2 (Opacity Limitations), except as provided in 326 IAC 5-1-3 (Temporary Exemptions), opacity shall meet the following, unless otherwise stated in this permit:

- (a) Opacity shall not exceed an average of forty percent (40%) any one (1) six (6) minute averaging period as determined in 326 IAC 5-1-4.
- (b) Opacity shall not exceed sixty percent (60%) for more than a cumulative total of fifteen (15) minutes (sixty (60) readings) as measured according to 40 CFR 60, Appendix A, Method 9 or fifteen (15) one (1) minute nonoverlapping integrated averages for a continuous opacity monitor) in a six (6) hour period.

326 IAC 6-2 (Particulate Emission Limitations for Sources of Indirect Heating)

This modification is not subject to the requirements of 326 IAC 6-2 (Particulate Emission Limitations for Sources of Indirect Heating) because the burners are not utilized for indirect heating.

326 IAC 7-1.1-1 (Sulfur Dioxide Emission Limitations)

This modification of addition of burners is not subject to the requirements of 326 IAC 7-1.1-1 (Sulfur Dioxide Emission Limitations) because the potential to emit of the sulfur dioxide from these facilities are less than 25 tons per year. The burners shall only combust natural gas.

326 IAC 8-1-6 (New facilities; General Reduction Requirements):

This modification is not subject to the requirements of 326 IAC 8-1-6 (New facilities; general reduction requirements) because the potential to emit of VOC from this modification is less than 25 tons per year per unit.

326 IAC 9 (Carbon Monoxide Emission Limits):

Pursuant to 326 IAC 9 (Carbon Monoxide Emission Limits), the modification is subject to this rule because it is a stationary source which emits CO emissions and commenced operation after March 21, 1972. Under this rule, there is not a specific emission limit because the source is not an operation listed under 326 IAC 9-1-2.

326 IAC 10 (Nitrogen Oxides)

This new source is not subject to the requirements of 326 IAC 10 (Nitrogen Oxides) because the source is not located in the specified counties (Clark and Floyd) listed under 326 IAC 10-1-1.

Testing Requirements

The Permittee shall test the NO_x emissions from the Preheat section and radiant heat section of the Galvanizing line after SCR/SNCR systems to show compliance with the limits set in BACT under 326 IAC 2-2 (PSD) and in accordance with the provisions of Agreed Order 2000-8861-A, dated February 2, 2000 and subsequent amendment dated June 16, 2000. The permittee has tested the SCR/SNCR exhausts on March 9, 2001 and has shown compliance with the limits under BACT. The test shall be repeated at least once every five (5) years from the date of this valid compliance demonstration.

Compliance Requirements

Permits issued under 326 IAC 2-7 are required to ensure that source can demonstrate compliance with applicable state and federal rules on a more or less continuous basis. All state and federal rules contain compliance provisions, however, these provisions do not always fulfill the requirement for a more or less continuous demonstration. When this occurs, IDEM, OAQ, in conjunction with the source, must develop specific conditions to satisfy 326 IAC 2-7-5. As a result, compliance requirements are divided into two sections: Compliance Determination Requirements and Compliance Monitoring Requirements.

Compliance Determination Requirements in Section D of the permit are those conditions that are found more or less directly within state and federal rules and the violation of which serves as grounds for enforcement action. If these conditions are not sufficient to demonstrate continuous compliance, they will be supplemented with Compliance Monitoring Requirements, also Section D of the permit. Unlike Compliance Determination Requirements, failure to meet Compliance Monitoring conditions would serve as a trigger for corrective actions and not grounds for enforcement action. However, a violation in relation to a compliance monitoring condition will arise through a source's failure to take the appropriate corrective actions within a specific time period.

The compliance monitoring requirements applicable to this modification are specified under continuous emissions monitoring system rule applicability in this TSD.

The source shall be required to install a continuous emissions monitoring system in accordance with 326 IAC 3-5, to demonstrate compliance with the above mentioned NO_x limits.

Conclusion

The construction and operation of this proposed modification shall be subject to the conditions of the attached Part 70 Significant Source Modification No. 107-14297-00038.

Appendix A: Emissions Calculations**Natural Gas Combustion Only****Preheat Section****36 Low NOx Burners @ 1.622 MMBtu/hr and 3 Auxillary Burners @ 0.1 MMBtu/hour in Galvanizing line****Company Name: Nucor Steel****Address City IN Zip: Route 2, Box 311, Crawfordsville, Indiana 46933****CP: 107-14297****Plt ID: 107-00038****Reviewer: GS****Date: October 10, 2001**Heat Input Capacity
MMBtu/hrPotential Throughput
MMCF/yr

58.7

514.1

Pollutant

	PM*	PM10*	SO2	NOx	VOC	CO
Uncontrolled Emission Factor in lb/MMCF	1.9	7.6	0.6	200.0	5.5	84.0
Potential Emission in tons/yr	0.5	2.0	0.2	51.4	1.4	21.6

*PM emission factor is filterable PM only. PM10 emission factor is filterable and condensable PM10 combined.

Pollutant

	PM*	PM10*	SO2	NOx	VOC	CO
Controlled or Limited Emission Factor in lb/MMCF	1.9	7.6	0.6	50.0	5.5	84.0
Potential Emission in tons/yr	0.5	2.0	0.2	12.9	1.4	21.6

Methodology

All emission factors are based on normal firing.

Potential Throughput (MMCF) = Heat Input Capacity (MMBtu/hr) x 8,760 hrs/yr x 1 MMCF/1,000 MMBtu

Emission Factors are from AP 42, Chapter 1.4, Tables 1.4-1, 1.4-2, 1.4-3, SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03 (SUPPLEMENT D 3/98)

Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

Appendix A: Emissions Calculations**Natural Gas Combustion Only****Radiant Tube Section****44 Low NOx Burners @ 0.323 MMBtu/hr in Galvanizing line****Company Name: Nucor Steel****Address City IN Zip: Route 2, Box 311, Crawfordsville, Indiana 46933****CP: 107-14297****Pit ID: 107-00038****Reviewer: GS****Date: October 10, 2001**Heat Input Capacity
MMBtu/hrPotential Throughput
MMCF/yr

14.2

124.3

Pollutant						
Uncontrolled Emission Factor in lb/MMCF	PM* 1.9	PM10* 7.6	SO2 0.6	NOx 415.0	VOC 5.5	CO 84.0
Potential Emission in tons/yr	0.1	0.5	0.0	25.8	0.3	5.2

*PM emission factor is filterable PM only. PM10 emission factor is filterable and condensable PM10 combined.

Pollutant						
Controlled or Limited Emission Factor in lb/MMCF	PM* 1.9	PM10* 7.6	SO2 0.6	NOx 103.8	VOC 5.5	CO 84.0
Potential Emission in tons/yr	0.1	0.5	0.0	6.4	0.3	5.2

Methodology

All emission factors are based on normal firing.

Potential Throughput (MMCF) = Heat Input Capacity (MMBtu/hr) x 8,760 hrs/yr x 1 MMCF/1,000 MMBtu

Emission Factors are from AP 42, Chapter 1.4, Tables 1.4-1, 1.4-2, 1.4-3, SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03
(SUPPLEMENT D 3/98)

Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

Appendix A: Emissions Calculations**Natural Gas Combustion Only****Alkaline Cleaning Heater****Auxiliary Burners @ 3.2 MMBtu/hour in Galvanizing line****Company Name: Nucor Steel****Address City IN Zip: Route 2, Box 311, Crawfordsville, Indiana 46933****CP: 107-14297****Pit ID: 107-00038****Reviewer: GS****Date: October 10, 2001**Heat Input Capacity
MMBtu/hrPotential Throughput
MMCF/yr

3.2

28.0

Pollutant						
Emission Factor in lb/MMCF	PM* 1.9	PM10* 7.6	SO2 0.6	NOx 200.0	VOC 5.5	CO 84.0
Potential Emission in tons/yr	0.0	0.1	0.0	2.8	0.1	1.2

*PM emission factor is filterable PM only. PM10 emission factor is filterable and condensable PM10 combined.

Methodology

All emission factors are based on normal firing.

Potential Throughput (MMCF) = Heat Input Capacity (MMBtu/hr) x 8,760 hrs/yr x 1 MMCF/1,000 MMBtu

Emission Factors are from AP 42, Chapter 1.4, Tables 1.4-1, 1.4-2, 1.4-3, SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03 (SUPPLEMENT D 3/98)

Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

Appendix A: Emissions Calculations

Natural Gas Combustion Only

Strip Dryer

2 Auxillary Burners @ 1.5 MMBtu/hr in Galvanizing line

Company Name: Nucor Steel

Address City IN Zip: Route 2, Box 311, Crawfordsville, Indiana 46933

CP: 107-14297

Pit ID: 107-00038

Reviewer: GS

Date: October 10, 2001

Heat Input Capacity
MMBtu/hr

Potential Throughput
MMCF/yr

3.0

26.3

	Pollutant					
	PM*	PM10*	SO2	NOx	VOC	CO
Emission Factor in lb/MMCF	1.9	7.6	0.6	200.0	5.5	84.0
Potential Emission in tons/yr	0.0	0.1	0.0	2.6	0.1	1.1

*PM emission factor is filterable PM only. PM10 emission factor is filterable and condensable PM10 combined.

Methodology

All emission factors are based on normal firing.

Potential Throughput (MMCF) = Heat Input Capacity (MMBtu/hr) x 8,760 hrs/yr x 1 MMCF/1,000 MMBtu

Emission Factors are from AP 42, Chapter 1.4, Tables 1.4-1, 1.4-2, 1.4-3, SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03 (SUPPLEMENT D 3/98)

Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

Appendix A: Emissions Calculations

Natural Gas Combustion Only

Zinc Pot

2 Emergency Burners @ 0.58 MMBtu/hour in Galvanizing line

Company Name: Nucor Steel

Address City IN Zip: Route 2, Box 311, Crawfordsville, Indiana 46933

CP: 107-14297

Pit ID: 107-00038

Reviewer: GS

Date: October 10, 2001

Heat Input Capacity
MMBtu/hr

Potential Throughput
MMCF/yr

1.2

10.2

	Pollutant					
	PM*	PM10*	SO2	NOx	VOC	CO
Emission Factor in lb/MMCF	1.9	7.6	0.6	200.0	5.5	84.0
Potential Emission in tons/yr	0.0	0.0	0.0	1.0	0.0	0.4

*PM emission factor is filterable PM only. PM10 emission factor is filterable and condensable PM10 combined.

Methodology

All emission factors are based on normal firing.

Potential Throughput (MMCF) = Heat Input Capacity (MMBtu/hr) x 8,760 hrs/yr x 1 MMCF/1,000 MMBtu

Emission Factors are from AP 42, Chapter 1.4, Tables 1.4-1, 1.4-2, 1.4-3, SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03 (SUPPLEMENT D 3/98)

Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

Appendix A: Emissions Calculations**Natural Gas Combustion Only****Preheat open end****2 Auxillary Burners @ 0.013 MMBtu/hr and 4 pot roll heater burners @ 0.058 MMBtu/hour in Galvanizing line****Company Name: Nucor Steel****Address City IN Zip: Route 2, Box 311, Crawfordsville, Indiana 46933****CP: 107-14297****Pit ID: 107-00038****Reviewer: GS****Date: October 10, 2001**Heat Input Capacity
MMBtu/hrPotential Throughput
MMCF/yr

0.3

2.3

	Pollutant					
	PM*	PM10*	SO2	NOx	VOC	CO
Emission Factor in lb/MMCF	1.9	7.6	0.6	200.0	5.5	84.0
Potential Emission in tons/yr	0.0	0.0	0.0	0.2	0.0	0.1

*PM emission factor is filterable PM only. PM10 emission factor is filterable and condensable PM10 combined.

Methodology

All emission factors are based on normal firing.

Potential Throughput (MMCF) = Heat Input Capacity (MMBtu/hr) x 8,760 hrs/yr x 1 MMCF/1,000 MMBtu

Emission Factors are from AP 42, Chapter 1.4, Tables 1.4-1, 1.4-2, 1.4-3, SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03 (SUPPLEMENT D 3/98)

Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

Appendix A: Emissions Calculations

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Natural Gas Combustion Only**Galvanizing line****Summary of Emission from Page 1 to 6****Company Name: Nucor Steel****Address City IN Zip: Route 2, Box 311, Crawfordsville, Indiana 46933****CP: 107-14297****Plt ID: 107-00038****Reviewer: GS****Date: October 10, 2001**

Summary	Pollutant					
	PM*	PM10*	SO2	NOx	VOC	CO
Uncontrolled						
Potential Emission in tons/yr	0.7	2.7	0.2	83.9	1.9	29.6

*PM emission factor is filterable PM only. PM10 emission factor is filterable and condensable PM10 combined.

Summary	Pollutant					
	PM*	PM10*	SO2	NOx	VOC	CO
Controlled or Limited						
Potential Emission in tons/yr	0.7	2.7	0.2	26.0	1.9	29.6

*PM emission factor is filterable PM only. PM10 emission factor is filterable and condensable PM10 combined.

Air Quality Analysis

Introduction

Nucor Steel has applied for a permit to modify their gas combustion and strip caster equipment near Crawfordsville in Montgomery County, Indiana. The site is located at Universal Transverse Mercator (UTM) coordinates 514600 East and 4425500 North. Montgomery County is designated as attainment for all of the National Ambient Air Quality Standards. These standards for Nitrogen Dioxide (NO₂), Sulfur Dioxide (SO₂), Carbon Monoxide (CO) and Particulate Matter less than 10 microns (PM₁₀) are set by U.S. EPA to protect the public health and welfare.

The permit application was received by the Office of Air Quality (OAQ) on August 24, 2001. This document provides Modeling Section's review of the permit application including an air quality analysis performed by the OAQ.

Air Quality Analysis Objectives

The OAQ review of the air quality impact analysis portion of the permit application will accomplish the following objectives:

- A. Establish which pollutants require an air quality analysis based on the source's emissions.
- B. Determine the ambient air concentrations of the source's emissions and provide analysis of actual stack height with respect to Good Engineering Practice (GEP).
- C. Demonstrate that the source will not cause or contribute to a violation of the National Ambient Air Quality Standard (NAAQS) or Prevention of Significant Deterioration (PSD) increment.
- D. Perform a brief qualitative analysis of the source's impact on general growth, soils, vegetation and visibility in the impact area with emphasis on any Class I areas. The nearest Class I area is Kentucky's Mammoth Cave National Park which is more than 250 kilometers from the proposed power facility site in Montgomery County, Indiana.

Summary

Nucor Steel has applied for a construction permit to modify their gas combustion and strip caster equipment, near Crawfordsville in Montgomery County, Indiana. The application was prepared by URS Corporation. Montgomery County is currently designated as attainment for all criteria pollutants. Nitrogen Dioxide (NO₂), Sulfur Dioxide (SO₂), Carbon Monoxide (CO) and Particulate Matter less than 10 microns (PM₁₀) emission rates associated with the proposed power facility exceeded their respective significant emission rates. Modeling results taken from the Industrial Source Complex Short Term (ISCST3) model showed that for all pollutants but CO, impacts were predicted to be more than the significant impact increments and significant monitoring de minimus levels. The PM₁₀, NO₂ and SO₂ increments and air quality standards were found to be maintained. There was no impact review conducted for the nearest Class I area, which is Mammoth Cave National Park in Kentucky, due to its large distance from the source. An additional impact analysis on the surrounding area was conducted and showed no significant impact on soils, vegetation, federal and state endangered species or visibility from the proposed facility.

Part A - Pollutants Analyzed for Air Quality Impact

Indiana Administrative Codes (326 IAC 2-2) PSD requirements apply in attainment and unclassifiable areas and require an air quality impact analysis of each regulated pollutant emitted in significant amounts by a new major stationary source or modification. Significant emission levels for each pollutant are defined in 326 IAC 2-2-1. CO, NO₂, SO₂, VOC (ozone) and PM₁₀ will be emitted from

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Nucor Steel and an air quality analysis is required for CO, NO₂, SO₂ and PM₁₀ which exceeded their significant emission rates as shown in Table 1.

TABLE 1 - Nucor Steel's Emission Rates (tons/yr)		
<u>Pollutant</u>	<u>Maximum Allowable Emissions</u>	<u>Significant Emission Rate</u>
CO	104.1	100.0
NO ₂	88.2	40.0
SO ₂	111.0	40.0
PM ₁₀	61.2	15.0
Lead	0.014	0.6
VOC	9.1	40.0

Significant emission rates are established to determine whether a source is required to conduct an air quality analysis. If a source exceeds the significant emission rate for a pollutant, air dispersion modeling is required for that specific pollutant. A modeling analysis for each pollutant is conducted to determine whether the source modeled concentrations would exceed significant impact increments. Modeled concentrations below significant impact increments are not required to conduct further air quality modeling. Modeled concentrations exceeding the significant impact increment would be required to conduct more refined modeling which would include source inventories and background data.

Part B - Significant Impact Analysis

An air quality analysis, including air dispersion modeling, was performed to determine the maximum concentrations of the source emissions on receptors outside of the facility property lines. Long-term (annual) worst-case determinations were based on number of hours of operation per year, while short-term were based on maximum pound/hour emission rates..

Model Description

The Office of Air Management review used the Industrial Source Complex Short Term (ISCST3) model, Version 3, dated June 4, 1999 to determine maximum off-property concentrations or impacts for each pollutant. All regulatory default options were utilized in the United States Environmental Protection Agency (U.S. EPA) approved model, as listed in the 40 Code of Federal Register Part 51, Appendix W "Guideline on Air Quality Models". The model also utilized the Schulman-Scire algorithm to account for building downwash effects. Stacks associated with the proposed power facility are below the Good Engineering Practice (GEP) formula for stack heights. This indicates that wind flow over and around surrounding buildings can influence the dispersion of pollutant coming from the stacks. 326 IAC 1-7-3 requires a study to demonstrate that excessive modeled concentrations will not result from stacks with heights less than the GEP stack height formula. These aerodynamic downwash parameters were calculated using U.S. EPA's Building Profile Input Program (BPIP).

Meteorological Data

The meteorological data used in the ISCST3 model consisted of surface data from the Indianapolis National Weather Service station merged with the mixing heights from Peoria, Illinois National Weather Service Station for the five-year period (1990-1994). The 1990-1994 meteorological data was purchased through the National Oceanic and Atmospheric Administration (NOAA) and National Climatic Data Center (NCDC) and preprocessed into ISCST3 format with an updated version of U.S.

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EPA's PCRAMMET program.

Modeled Results

Maximum modeled concentrations for each pollutant over its significant emission rate are listed below in Table 2 and are compared to each pollutant's significant impact increment for Class II areas, as specified by U.S. EPA.

TABLE 2 - Summary of OAM's Significant Impact Analysis (ug/m3)					
<u>Pollutant</u>	<u>Year</u>	<u>Time-Averaging Period</u>	<u>Dayton Maximum Modeled Impacts</u>	<u>Significant Impact Increments</u>	<u>Significant Monitoring Increments</u>
CO	1994	1-hour	112.6	2000.0	^a
CO	1990	8-hour	44.2	500.0	575
SO ₂	1991	3-hour	83.1	25.0	^a
SO ₂	1994	24-hour	30.8	5.0	13.0
SO ₂	1991	Annual	2.2	1.0	^a
PM ₁₀	1991	24-hour	16.9	5.0	10.0
PM ₁₀	1991	Annual	4.1	1.0	^a
NO ₂	1992	Annual	2.7	1.0	14.0

^a No limit exists for this time-averaged period

Modeled concentrations for each pollutant except CO was above both the significant impact increment and any applicable significant monitoring de minimus levels.

Nitrous Oxides

Since modeled concentrations for NO₂ were above significant impact, modeling was performed to determine total increment consumption and to demonstrate compliance with the NAAQS. There was no representative monitor within 50 kilometers of the project so the highest monitored reading in the state was used as a conservative estimate. The modeling results in Table 3 show that the increment as well as the National Ambient Air Quality Standard for Nitrous Oxides is maintained.

Table 3 - NO ₂ Modeling Results (ug/m3)						
<u>Project Impact</u>	<u>Increment Consumed</u>	<u>Available Increment*</u>	<u>Modeled NAAQS Total</u>	<u>Monitored Value</u>	<u>Total NO₂</u>	<u>NO₂ Standard</u>
2.7	11.1	20	11.8	33.8	45.6	100

* Indiana allows a source to consume a maximum of 80% of the remaining 25 ug/m3 NO₂ increment

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PM10

Since modeled concentrations for PM10 were above significant impact, modeling was performed to determine total increment consumption and to demonstrate compliance with the NAAQS. There was no representative monitor within 50 kilometers of the project so the highest monitored reading in the state was used as a conservative estimate. The modeling results in Table 4 show that the increment as well as the National Ambient Air Quality Standard for PM10 is maintained.

Table 4 - PM10 Modeling Results (ug/m3)						
<u>Project Impact</u>	<u>Total Increment Consumed</u>	<u>Available Increment*</u>	<u>Modeled NAAQS Total</u>	<u>Monitored Value</u>	<u>Total PM10</u>	<u>PM10 Standard</u>
4.1	5.9	17	5.9	21.0	26.9	50 (Annual)
16.9	27.5	30	27.5	41.3	68.8	150 (24-hr)

* Indiana allows a source to consume a maximum of 80% of the remaining NO2 increment on a point-by-point basis. At no point has more than 80% of the existing increment been consumed. The project's area of peak impact does not coincide with the area of total peak increment.

Sulfur Oxides

Since modeled concentrations for SO2 were above significant impact, modeling was performed to determine total increment consumption and to demonstrate compliance with the NAAQS. There was no representative monitor within 50 kilometers of the project so the highest monitored reading in the state was used as a conservative estimate. The modeling results in Table 5 shows that the increment as well as the National Ambient Air Quality Standard for sulfur dioxide is maintained.

Table 5 - SO2 Modeling Results (ug/m3)						
<u>Project Impact</u>	<u>Increment Consumed</u>	<u>Available Increment*</u>	<u>Modeled NAAQS Total</u>	<u>Monitored Value</u>	<u>Total SO2</u>	<u>SO2 Standard</u>
2.2	4.9	20	5.3	31.4	36.7	80
30.8	52.0	91	52.1	99.6	151.7	365
83.1	137.1	512	137.1	414.8	551.9	1300

* Indiana allows a source to consume a maximum of 80% of the remaining SO2 increment

Part D - Additional Impact Analysis

PSD regulations require additional impact analysis be conducted to show that impacts associated with the facility would not adversely affect the surrounding area. An analysis on soils, vegetation and visibility and is listed below.

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Soils Analysis

Secondary NAAQS limits were established to protect general welfare which includes soils, vegetation, animals and crops. Soil types in Montgomery County are predominately Miami-Crosby silt loam and Russell Fincastle associations. The general landscape consists of Tipton Till Plain or flat to gently rolling terrain (1816 - 1966 Natural Features of Indiana - Indiana Academy of Science). According to the low modeled PM10 concentrations and the insignificant modeled concentrations CO, NO2, and SO2 along with the HAPs analysis, the soils will not be adversely affected by the proposed power facility.

Vegetation Analysis

Due to the agricultural nature of the land, vegetation in the Montgomery County area consists mainly of crops such as corn, wheat, oats, soybeans and hay. The maximum modeled concentrations of the proposed power facility for CO, NO2, SO2 and PM10 are well below the threshold limits necessary to have adverse impacts on surrounding vegetation (Flora of Indiana - Charles Deam). Federally endangered or threatened plants as listed in the U.S. Fish and Wildlife Service, Division of Endangered Species for Indiana list two threatened and one endangered species of plants. The endangered plant is found along the sand dunes in northern Indiana while the two threatened species do not thrive on cultivated or grazing land. Trees in the area are considered hardy trees and due to the modeled concentrations, no significant adverse impacts are expected.

Federal and State Endangered Species Analysis

Federally endangered or threatened species as listed in the U.S. Fish and Wildlife Service, Division of Endangered Species for Indiana include 12 species of mussels, 4 species of birds, 2 species of bat and butterflies and 1 specie of snake. The mussels and birds listed are commonly found along major rivers and lakes while the bats are found near caves. The proposed site will not adversely impact these habitats. The agricultural nature of the land overall has disturbed the habitats of the butterflies and snake and the proposed facility is not expected to impact the area further. The state of Indiana's list of endangered, special concern and extirpated nongame species, as listed in the Department of Natural Resources, Division of Fish and Wildlife, contains species of birds, amphibians, fish, mammals, mollusks and reptiles which may be found in the area of the proposed facility. However, the impacts are not expected to have any additional adverse effects on the habitats of the species than what has already occurred from the agricultural activity in the area.

Additional Analysis Conclusions

The nearest Class I area to the proposed power facility is the Mammoth Cave National Park located at least 250 km to the south in Kentucky. Operation of the proposed power facility will not adversely affect the visibility at this Class I area. The results of the additional impact analysis conclude the Nucor Steel's proposed power facility will have no adverse impact on economic growth, soils, vegetation, endangered or threatened species or visibility on any Class I area.

APPENDIX C

BEST AVAILABLE CONTROL TECHNOLOGY (BACT) DETERMINATION

Source Background and Description

Source Name:	Nucor Steel.
Source Location:	RR 2, Box 311, CR 400 East, Crawfordsville, IN 47933
County:	Montgomery
Significant Source Modification No.:	107-14297-00038 and 107-11908-00038
SIC Code:	3312
Permit Reviewers:	Gurinder Saini

Background

The Indiana Department of Environmental Management (IDEM) has performed the following federal BACT review for the following equipment:

1. thirty six (36) burners in the preheat furnace section of the galvanizing line (out of which twenty (20) are unpermitted) using natural gas rated at maximum total capacity of 58.7 MMBtu per hour.
2. To standardize the emission from all forty four (44) radiant tube section with a maximum total capacity of 14.2 MMBtu per hour and replace non-confirming burners.
3. Add a new galvalum tank to the galvanizing line.

The source is located in Montgomery County which is designated as attainment or unclassifiable for all criteria pollutants. Based upon the emission calculations, the modification exceeds the PSD significant threshold levels stated in 326 IAC 2-2-1 for PM, PM₁₀, NO_x, CO, and SO₂. Therefore, these pollutants were reviewed pursuant to the PSD Program (326 IAC 2-2 and 40 CFR 52.21). The PSD Program requires a BACT review and air quality modeling. BACT is an emission limitation based on the maximum degree of reduction of each pollutant subject to the PSD requirements. In accordance with the *"Top-Down" Best Available Control Technology Guidance Document* outlined in the 1990 draft USEPA *New Source Review Workshop Manual*, this BACT analysis takes into account the energy, environmental, and economic impacts on the source. These reductions may be determined through the application of available control techniques, process design, and/or operational limitations. Such reductions are necessary to demonstrate that the emissions remaining after application of BACT will not cause or contribute to air pollution thereby protecting public health and the environment.

The following BACT determinations are based on information obtained from the PSD permit application submitted by Nucor on February 21, 2000, additional documentation provided by Nucor subsequent to the submittal of the application, information submitted by commenters during the two (2) comment periods, and the EPA RACT/BACT/LAER (RBLC) Clearinghouse.

The key steps in the top-down process are:

1. Identify viable options;
2. Eliminate technically infeasible options;
3. Rank remaining alternatives by control effectiveness;
4. Evaluate most effective controls, considering energy, environmental and economic impacts and other costs; and
5. Select BACT.

The sources of information for control alternatives vary based on the emission units being analyzed. The following information resources may be consulted in searching for the alternatives:

1. Online USEPA RACT/BACT/LAER Clearinghouse (RBLC) System;
2. USEPA/State/Local Air Quality Permits;
3. Federal/State/Local Permit Engineers;
4. Control Technology Vendors; and
5. Inspection/Performance Test Reports.

Once the technically feasible control alternatives have been identified, they are ranked in order of control effectiveness, with the most effective control alternative at the top. The ranked alternatives are reviewed with respect to environmental, energy, and economic considerations specific to the proposed modification. If the analysis determines that the examined alternative is not appropriate as BACT due to any of these considerations, then the next most stringent alternative is subjected to the same review. This process is repeated until a control alternative is justified to represent BACT. The proposed BACT must provide emission limitations which are at least as stringent as the applicable federally-approved State Implementation Plan (SIP) or the federal NSPS and National Emission Standards for Hazardous Air Pollutants (NESHAP) emission standards.

The impact analysis of the BACT review focuses on environmental, energy, and economic impacts. The net environmental impact associated with the control alternative should be reviewed. The dispersion modeling normally considers a "worst-case" scenario, thus constituting an assessment of the maximum environmental impacts. The energy impact analysis estimates the direct energy impacts of the control alternatives in units of energy consumption. The economic impact of a control option is typically assessed in terms of cost-effectiveness and ultimately whether the option is economically reasonable.

1. BACT Analysis for Preheat Furnace Burners

The twenty unpermitted preheat burners (each rated at 1.62 MMBtu/hr) are fired with natural gas using low-NO_x burners. The control technology assessment for the twenty unpermitted burners is provided below.

(A) Control of Oxides of Nitrogen (NO_x) Emissions

NO_x is formed from the chemical reaction between nitrogen and oxygen at high temperatures in the furnace. NO_x formation occurs by different mechanisms. In the case of galvanizing lines, a portion of the NO_x forms from thermal dissociation and subsequent reaction of nitrogen and oxygen molecules in the combustion air. This mechanism of NO_x formation is referred to as thermal NO_x. The second mechanism of NO_x formation known as fuel NO_x (due to the evolution and reaction of fuel-bound nitrogen compounds with oxygen) also has a contribution to the NO_x being emitted from the galvanizing line. The third kind of NO_x formation known as prompt NO_x (due to the formation of HCN followed by oxidation to NO_x) is thought to have a minimal contribution to NO_x emissions from galvanizing lines.

The total heat input for the preheat furnace burners is 58.7 MMBtu/hr. The proposed NO_x emission rate is 51.42 tons per year utilizing low-NO_x burners. This emission rate is considered baseline emissions in this BACT analysis.

Several sources were consulted regarding recent steel mill operations and the associated

controls successfully implemented. These sources included the RBLC database, recent permit applications, USEPA air permitting authorities, and proposed equipment vendors.

The following table presents a summary of the recent galvanizing lines and the controls used.

SOURCE	HEAT INPUT (MMBtu/hr)	NO _x EMISSION LIMIT (lb/MMBtu)	CONTROL
SDI - Butler, IN	100	0.2	Low NO _x burner
Nucor - Huger, SC	83.5	0.076	SCR/SNCR
Nucor - Hickman, AR	78.3	0.035	SCR
AK Steel - Rockport, IN*	205.7	0.06	SCR

* galvaneal furnace.

Based on a review of the RBLC database and discussions with various experts knowledgeable about steel mill operations, the potential control technologies for NO_x abatement from steel mill galvanizing lines were evaluated. The available potential control options will be reviewed for technical feasibility in this BACT analysis.

Potential NO_x Control Alternatives

- (1) Combustion Controls – low-NO_x combustion;
- (2) Non-Selective Catalytic Reduction (NSCR);
- (3) Selective Catalytic Reduction (SCR);
- (4) Selective Non-Catalytic Reduction (SNCR) options -
 - Exxon's Thermal DeNO_x®
 - Nalco Fuel Tech's NO_xOUT®
- (5) Low-Temperature Oxidation (LTO); and
- (6) SCONO_x™ Catalytic Oxidation/Absorption.

Technical Feasibility of NO_x Control Alternatives

- (1) **Combustion Controls** – There is an entire family of combustion controls for NO_x reduction from various combustion units. Typically, for applications analogous to furnaces, the combustion control options generally include the following:

- a. Low Excess Air (LEA);
- b. Low-NO_x Burners (LNBs);
- c. Overfire Air (OFA);
- d. Burners Out Of Service (BOOS);
- e. Reduced Combustion Air Temperature;
- f. Load Reduction; and
- g. Flue Gas Recirculation (FGR)

The **LEA option** is typically used in conjunction with some of the other options. The use of this option will result in the generation of additional CO emissions. In addition, LEA is not very effective for furnaces. Thus, this option will be precluded from further consideration in this BACT analysis.

The preheat furnace section already employs **Low-NO_x burners**. Thus, this option will be included for further consideration in this BACT analysis.

The **OFA option** is geared primarily to fuel NO_x reduction, which is not the major NO_x formation mechanism from preheat furnaces. Further, this option is associated with potential operational problems due to low primary air creating incomplete combustion conditions. Such conditions can result in the production of steel which cannot be adequately rolled. Thus, this option will be precluded from further consideration in this BACT analysis.

The **BOOS and Load Reduction (or Deration) options** incorporate a reduction in the furnace load; thereby reducing the formation of NO_x emissions. However, to accommodate these options, the furnace would need to be “over-sized”; resulting in additional capital and installation costs. In addition, the reduced firing rates will alter the heat distribution within the furnaces; potentially causing uneven heating of the steel. Such uneven heating may produce steel that does not meet quality specifications. Thus, these options will be precluded from further consideration in this BACT analysis.

The **Reduced Combustion Air Temperature option** inhibits thermal NO_x production. This option is addressed under the following discussion on ultra low-NO_x burners which employ this technology. The control option was found to be cost excessive. Thus, this option will be precluded from further consideration in this BACT analysis.

The **FGR option** involves recycling a portion of the cooled exit flue gas back into the primary combustion zone. Typically, FGR is useful in reducing thermal NO_x formation by lowering the oxygen concentration in the combustion zone. A major limitation of FGR is that it alters the distribution of heat (resulting in cold spots in the furnace) and lowers the efficiency of the furnace. This can produce steel that does not meet quality specifications. In view of the above limitations, FGR will be precluded from further consideration in this BACT analysis.

Low-NO_x burners -- Nucor currently has burners capable of achieving 0.2 lbs NO_x/MMBtu heat input installed in the preheat section. Nucor believes that these burners are considered “low-NO_x” for PSD and BACT purposes. As installed, these burners are rated at 1.62 MMBtu/hr for a total NO_x emissions of 51 tons/year (36 burners * 1.62 MMBtu/hr * 0.2 lbs NO_x/MMBtu * 8760 hours *

0.0005 ton/lb). Natural gas consumption is estimated at 468 mmscf per year.

Ultra Low-NO_x burners -- Nucor also considered ultra low-NO_x burners, which would use cooler combustion air to achieve reduced emissions. The replacement ultra low-NO_x burners, will have NO_x emission rate of 22 tons per year (36 burners * 1.62 MMBtu/hr * 0.09 lbs NO_x/MMBtu * 8760 hours * 0.0005 ton/lb). This will result in a reduction of 29 tons per year of NO_x emissions from the preheat furnace section. Natural gas consumption would increase, from 468 mmscf per year to 585 mmscf per year as per manufacturer's estimate, with a resulting annual operating cost differential of \$286,627 per year based on Nucor's cost of energy. Installation of ultra low-NO_x burners would result in additional operational cost of \$9,929 per ton of NO_x removed. This does not include cost for the new burners or their installation which would be extra. This cost is excessive and ultra low NO_x burners should not be considered BACT.

The following calculations are presented to support this conclusion. The galvanizing line preheat burners can employ cold air combustion to meet an emission rate of 0.09 lb NO_x/MMBtu. Thus, NO_x emissions are 12.7 tpy, which is a reduction of 15.6 tpy. The vendor indicated that cold air combustion requires 25 to 28% more natural gas than the standard low-NO_x burners. The cost for this alternative is as follows:

Low NO_x Burners: $(53,000 \text{ ft}^3/\text{hr})(\$0.247/\text{Therm})(1 \text{ Therm}/100 \text{ ft}^3) = \$130.91/\text{hour}$
Cold Air: $(53,000 \text{ ft}^3/\text{hr})(1.25)(\$0.247/\text{Therm})(1 \text{ Therm}/100 \text{ ft}^3) = \$163.63/\text{hour}$
 $(\$163.63 - \$130.91)(8760 \text{ hrs/year}) = \$286,627$
 $(\$286.627/29 \text{ tons NO}_x) = \$9,883/\text{ton removed}$

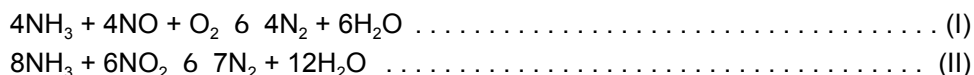
This annual cost for additional natural gas consumption (excluding the cost for replacing the burners) is considered excessive.

- (2) **Non-Selective Catalytic Reduction (NSCR)** -- The NSCR system is a post-combustion add-on exhaust gas treatment system. It is often referred to as a "three-way conversion" catalyst since it reduces NO_x, unburned hydrocarbons (UBH) and carbon monoxide simultaneously. In order to operate properly, the combustion process must be near-stoichiometric. Under this condition, in the presence of the catalyst, NO_x is reduced by CO, resulting in the formation of nitrogen and carbon dioxide. Currently, NSCR systems are limited to rich-burn IC engines with fuel rich ignition system applications. Moreover, potential problems with NSCR systems include catalyst poisoning by oil additives such as phosphorus and zinc.

As NSCR is used for only rich-burn IC combustion engines and requires near-stoichiometric combustion conditions and neither of these conditions are applicable for Nucor's galvanizing line, the NSCR option will be precluded from

further consideration in this BACT analysis.

- (3) **Selective Catalytic Reduction (SCR)** -- In this process, ammonia (NH_3), usually diluted with air or steam, is injected through a grid system into the exhaust gas stream upstream of a catalyst bed. On the catalyst surface the NH_3 reacts with NO_x to form molecular nitrogen and water. The basic reactions are as follows:



Usually, a fixed bed catalytic reactor is used for SCR systems. The function of the catalyst is to effectively lower the activation energy of the NO_x decomposition reactions.

Depending on system design, NO_x removal of 80 - 90 percent is achievable under optimum conditions (refer, USEPA "ACT Document - NO_x Emissions from Iron and Steel Mills", Sept., 1994). The reaction of NH_3 and NO_x is favored by the presence of excess oxygen. Another variable affecting NO_x reduction is exhaust gas temperature. The greatest NO_x reduction occurs within a reaction window at catalyst bed temperatures between 600EF - 750EF for conventional (vanadium or titanium-based) catalyst types, and 470EF - 510EF for platinum-based catalysts. Performance for a given catalyst depends largely on the temperature of the exhaust gas stream being treated. A given catalyst exhibits optimum performance when the temperature of the exhaust gas stream is at the midpoint of the reaction temperature window for applications where exhaust gas oxygen concentrations are greater than 1 percent. Below the optimum temperature range, the catalyst activity is greatly reduced, potentially allowing unreacted ammonia (referred to as "ammonia slip") to be emitted directly to the atmosphere. The potential release of unreacted ammonia (typically around 10-25 ppm) can result in adverse environmental impacts. Through a series of chemical reactions in the atmosphere, the free ammonia can form ammonium sulfate and ammonium nitrate in particulate form which can contribute to the formation of regional haze.

In order for a SCR system to effectively reduce NO_x emissions, the exhaust gas stream should have relatively stable gas flow rates, NO_x concentrations, and temperature. In addition, certain elements such as iron, nickel, chrome, and zinc can react with platinum catalysts to form compounds or alloys which are not catalytically active. These reactions are termed "catalytic poisoning", and can result in premature replacement of the catalyst. In addition, any solid material in the gas stream can form deposits and result in fouling or masking of the catalytic surface. Fouling occurs when solids obstruct the cell openings within the catalyst. Masking occurs when a film forms on the surface of catalyst over time.

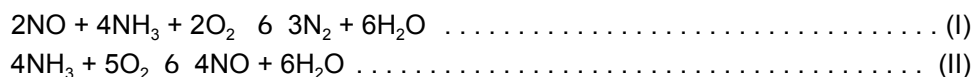
The film prevents contact between the catalytic surface and the flue gas. Both of these conditions can result in frequent cleaning and/or replacement requirements.

Based on a review of the literature and discussions with control technology vendors, Nucor has evaluated the economic feasibility of a particular configuration of SCR technology - Nalco Fuel Tech's NO_xOUT[®] SCR technology. The NO_xOUT[®] process utilizes a stabilized aqueous urea solution to form ammonia which reacts with a catalyst to reduce NO_x. The injection of the stabilized urea solution into a higher temperature window results in the formation of ammonia and thereby, precludes the direct injection of ammonia as in a traditional SCR system. In addition, the NO_xOUT[®] system also utilizes a high temperature catalyst that has optimal characteristics in the range 700-1,000EF with a favorable range of 900-1670EF which matches with the Nucor process exhaust gas temperature range. The elimination of direct ammonia injection in the Nalco Fuel Tech SCR adaptation alleviates the handling and storage of a regulated toxic chemical.

However, it should be noted that the limitations of SCR application discussed earlier are still valid for the NO_xOUT[®] process since the dominant NO_x reduction pathways are still unchanged. The economic feasibility analysis of the selected control configuration to reduce NO_x emissions from the preheat furnace of the galvanizing line is addressed below. The vendor, Nalco Fuel Tech has proposed a guaranteed NO_x emission rate of 0.05 lb/MMBtu reflecting a control efficiency of approximately 75% from the baseline.

- (4) **Selective Non-Catalytic Reduction (SNCR)** -- The two commercially available SNCR systems are reviewed below for technical feasibility in controlling preheat furnace NO_x emissions.

Exxon's Thermal DeNO_x[®] - Exxon's Thermal DeNO_x[®] system is a non-catalytic process for NO_x reduction. The process involves the injection of gas-phase ammonia (NH₃) into the exhaust gas stream to react with NO_x. The ammonia and NO_x react according to the following competing reactions:



The temperature of the exhaust gas stream is the primary criterion controlling the above selective reaction. Reaction (I) dominates in the temperature window of 1,600EF - 2,200EF resulting in a reduction of NO_x. However above 2,200EF, reaction (ii) begins to dominate, resulting in enhanced NO_x production. Below 1,600EF, neither reaction has sufficient activity to produce or destroy NO_x. Thus,

the optimum temperature window for the Thermal DeNO_x® process is approximately 1,600EF - 1,900EF. The above reaction temperature window can be shifted down to approximately 1,300EF - 1,500EF with the introduction of readily oxidizable hydrogen gas. In addition, the process also requires a minimum of 1.0 second residence time in the desired temperature window for any significant NO_x reduction.

In order for the Thermal DeNO_x® system to effectively reduce NO_x emissions, the exhaust gas stream should have relatively stable gas flow rates; ensuring the required residence time and be within the prescribed temperature range.

The technical infeasibility regarding Thermal DeNO_x® system application to Nucor's process is result of optimum temperature window for the process is not afforded by Nucor's cooler exhaust gas stream which is resident in the range of 900 - 1670EF. In addition, there are concerns with the availability of steady gas flows and prescribed residence times, thermal cycling and the ability of the control option to load-follow varying pollutant concentrations. In conclusion, application of a Thermal DeNO_x® system to reduce NO_x emissions from the preheat furnace is considered technically infeasible and will be precluded from further consideration in this BACT analysis.

Nalco Fuel Tech's NO_xOUT® - The NO_xOUT® process is very similar in principle to the Thermal DeNO_x® process, except that it involves the injection of a liquid urea compound (as opposed to NH₃) into the high temperature combustion zone to promote NO_x reduction. The chemical reaction proceeds as follows:



The reaction involves the decomposition of urea at temperatures of approximately 1,700EF - 3,000EF. Certain proprietary additive developments have allowed the operational temperature window to shift to approximately 1,400EF - 2,000EF. However, the process still has similar constraints as the Thermal DeNO_x® system. The limitations are dictated by the reaction-controlling variables such as stable gas flow rates for a minimum residence time of 1.0 second in the desired temperature window to ensure proper mixing.

Similar to the Thermal DeNO_x® system, the primary applicability concern regarding application of the NO_xOUT® technology to galvanizing line is that the optimum temperature window for the process is not afforded by preheat furnace's cooler exhaust gas stream which is resident around 900-1670EF. In addition, there are concerns with the availability of steady gas flows and prescribed residence times, thermal cycling and the ability of the control option

to load-follow varying pollutant concentrations. In conclusion, application of a NO_xOUT[®] system to reduce NO_x emissions from the preheat furnace is considered technically infeasible and will be precluded from further consideration in this BACT analysis.

- (5) **Low Temperature Oxidation (LTO)** -- LTO technology is still in its primordial stage and has not seen any preheat furnace application for steel mill galvanizing lines. The vendor has listed applications for mostly industrial boilers and cogeneration gas turbines which have a more favorable energy balance. The technology is a variant of SNCR technology using ozone. The ozone is injected into the gas stream and the NO_x in the gas stream is oxidized to nitrogen pentoxide (N₂O₅) vapor which is absorbed in the scrubber as dilute nitric acid (HNO₃). The nitric acid is then neutralized with caustic (NaOH) in the scrubber water forming sodium nitrate (NaNO₃). The overall chemical reaction can be summarized as follows:



For optimal performance, the technology requires stable gas flows, lack of thermal cycling, invariant pollutant concentrations and residence times of the order of 1-1.5 seconds. In addition, LTO technology requires frequent calibration of analytical instruments which sense the NO_x concentrations for proper adjustment of ozone injection. Since LTO uses ozone injection, it has a potential for ozone slip which can vary between 5-10 ppmv. Also, the technology requires a cooler flue gas of less than 300EF at the point of ozone injection, otherwise the reactive gas is rendered redundant. The technology also suffers from low NO_x conversion rates (40-60%), potential for nitric acid vapor release (in the event of a scrubber malfunction) with subsequent regional haze impacts and the handling, treatment and disposal issues for the spent scrubber effluent.

In conclusion, the technology is still nascent and evolving out of the earlier bench scale solution to effect a reliable SNCR application utilizing reactive gas-phase ozone to control NO_x emissions from combustion applications. The technology is neither applicable nor proven for the preheat section of steel mill galvanizing lines and attendant limitations render it technically infeasible in its current manifestation. In view of the above, the LTO control option will be precluded from further consideration in this BACT analysis.

- (6) **SCONO_xTM Catalytic Oxidation/Absorption** -- This is an emerging catalytic oxidation/ absorption technology that has been applied for concomitant reductions of NO_x, CO and VOC from an assortment of combustion applications that mostly include – turbines, boilers and lean-burn engines. The technology has never been applied for any preheat furnace application for steel mill

galvanizing lines. $\text{SCONO}_x^{\text{TM}}$ employs a single catalyst for converting NO_x , CO and VOC. The flue gas temperature should be preferably in the 300E-700EF range for optimal performance without deleterious effects on the catalyst assembly. In the initial oxidation cycle, the CO is oxidized to CO_2 , the NO gets converted to NO_2 and the VOC gets oxidized to carbon dioxide and water. The NO_2 is then absorbed on the potassium carbonate coated (K_2CO_3) catalyst surface forming potassium nitrites and nitrates (KNO_2 , KNO_3). Prior to saturation of the catalyst surface, the catalyst enters the regeneration cycle.

In the regeneration phase, the saturated catalyst section is isolated with the expedient of moving hinged louvers and then exposed to a dilute reducing gas (methane in natural gas) in the presence of a carrier gas (steam) in the absence of oxygen. The reductant in the regeneration gas reacts with the nitrites and nitrates to form water and elemental nitrogen. Carbon dioxide in the regeneration gas reacts with potassium nitrites and nitrates to recover the potassium carbonate, which is the absorber coating that was on the surface of the catalyst before the oxidation/ absorption cycle began. Water (as steam) and elemental nitrogen are exhausted up the stack and the re-deposited K_2CO_3 allows for another absorption cycle to begin.

The technology is not readily adaptable to high-temperature applications outside the 300E-700EF range and is susceptible to thermal cycling that will be experienced in the preheat furnace exhaust. In addition, the prospect of moving louvers that effect the isolation of the saturated catalyst readily lends itself to the possibility of thermal warp and in-duct malfunctions in general. Directional flow solutions are not yet known to have been implemented for this technology. Also, the K_2CO_3 coating on the catalyst surface is an active chemical reaction and reformulation site which makes it particularly vulnerable to fouling. On some field installations, the coating has been found to be friable and tends to foul in the harsh in-duct environment. During the regeneration step, the addition of the flammable reducing gas (natural gas which contains 85% methane) into the hot flue gas generates the possibility of LEL exceedances in the event the catalyst isolation is not hermetic or there is a failure in the carrier steam flow. Also, there is a possibility of some additional SO_2 emissions if the dry scrubber with the tandem $\text{SCOSO}_x^{\text{TM}}$ unit experiences a malfunction. In conclusion, $\text{SCONO}_x^{\text{TM}}$ technology is not considered technically feasible for Nucor's application. In view of the above, the $\text{SCONO}_x^{\text{TM}}$ control option will be precluded from further consideration in this BACT analysis.

Economic Feasibility of NO_x Control Alternatives

In determining the economic feasibility of the Nalco Fuel Tech NO_xOUT® SCR control option, guidance provided by the USEPA was utilized. The economic feasibility of a specific control alternative is expressed in terms of annualized dollars per ton of NO_x removed. By definition, cost effectiveness is the ratio of the total annualized cost of any control alternative to the annual quantity of pollutant the alternative removes from the process.

Total capital and annualized costs for the identified control alternatives were developed based on the cost estimating structure and guidance provided in the USEPA reference, "OAQPS Control Cost Manual", other relevant information provided by the respective equipment vendor, inputs from mill personnel and engineering judgment.

The estimated total annualized capital, operation and maintenance (O&M) cost for the installation of SCR system is \$224,000. At the vendor guaranteed NO_x emission rate of 0.05 lb/MMBtu, the cost effectiveness for SCR system is \$12,100 per ton of NO_x removed. This cost is considered prohibitive.

In conclusion, for the preheat furnace burners and preheat auxiliary burners, BACT is proposed as the use of low-NO_x natural gas-fired burners employing good combustion to meet an NO_x emission rate of 0.2 lb / MMBtu.

For ease of testing and consistency, the OAQ, IDEM has standardized the emission rate, before controls, for all thirty-six (36) primary and three (3) auxiliary preheat section burners at 0.2 lb NO_x/MMBtu as determined to be BACT in this review.

(B) Control of Carbon Monoxide and VOC Emissions

The proposed annual emission rates for CO and VOC from the additional preheat furnace burners are 29.5 tons and 1.9 tons, respectively. A review of the RBLC database did not indicate application of control alternatives for CO and VOC from galvanizing lines. Due to the relatively small size of burners used to combust natural gas, the application of add-on technologies is considered impractical and will be precluded from further consideration in the BACT analysis.

(C) Control of Particulate Matter (TSP/PM₁₀) Emissions

The annual PM₁₀ emission rate from the natural gas-fired burners is 0.94 tpy. Emissions were estimated using the AP-42 PM emission factor for natural gas combustion. Due to the nominal particulate loading using an extremely clean fuel, the use of add-on control

equipment (e.g., electrostatic precipitator, fabric filtration, venturi scrubber, multicyclone etc.) is considered impractical and will be precluded from further consideration in this BACT analysis. A review of the RBLC database did not indicate the application of add-on control alternatives for PM control from galvanizing lines. From the standpoint of particulate emission generation, natural gas is considered the cleanest fuel.

(D) Control of Sulfur Dioxide (SO₂) Emissions

The annual SO₂ emission rate from the preheat furnace burners is 0.2 tpy. Due to the relatively small emissions from natural gas combustion, the application of add-on controls is considered impractical and will be precluded from further consideration in this BACT analysis. A review of the RBLC database did not indicate the application of add-on control alternatives for SO₂ control from galvanizing lines.

2. REVISION OF NO_x EMISSION RATE FOR THE RADIANT TUBE SECTION OF THE GALVANIZING LINE

As per the Section II.2 and II.3 of the Agreed Order, Nucor and IDEM agreed that Nucor would request a revision in the permitted emission rate for the twenty (20) natural gas fired burners in the radiant section installed pursuant to CP 107-3702-00038. In accordance with BACT review for NO_x emissions carried out above, the emission rate of 0.2 lb/MMBtu of NO_x is determined to be BACT for galvanizing line. For ease of testing and consistency, the OAQ, IDEM, has standardized this NO_x emission rate for all forty-four (44) burners in the radiant tube section of the galvanizing line furnace.

Nucor has installed a Selective Catalytic Reduction system to reduce the NO_x emissions from the radiant tube section of the Galvanizing line. The SCR/SNCR system shall control NO_x emissions with at least 75% control efficiency and result in exhaust NO_x emission rate below 0.2 lb / MMBtu, BACT for this process.

3. PROPOSED ADDITION OF SCR/SNCR TECHNOLOGY TO PREHEAT SECTION (SUPPLEMENTAL ENVIRONMENTAL PROJECT)

In accordance with Section II.7 of the Agreed Order, Nucor has installed SCR/SNCR system, to achieve supplemental NO_x reductions from the preheat section of the galvanizing line furnace. These supplemental reductions are beyond those required for BACT, as outlined above. Nucor installed the Nalco Fuel Tech NO_xOUT SCR/SNCR system to achieve a final NO_x emission rate from the thirty-six primary burners and three auxiliary burners in the preheat section of the galvanizing line of 0.05 lb NO_x/MMBtu.